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"AS-BUILT" DESIGN SPECIFICATION FOR THE CLASFYG PROGRAM

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"AS-BUILT" DESIGN SPECIFICATION FOR THE CLASFYG PROGRAM

Job Order 71-308

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15. Supplementary Notes

16. Abstract

This document is the "As-Built" Design Specification for the CLASFYG program. The program produces a file with a Universal-formatted header and data records in a non-standard format. Trajectory coefficients are calculated from 5 to 8 acquisitions of radiance values in the training field corresponding to an agricultural product. These coefficients are used to calculate a time of emergance and corresponding trajectory coefficients for each pixel in the test field. The time of emergance, two of the coefficients and the sigma value for each pixel are written to the file.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
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CONTENTS

CLASFYG PROGRAM

1.0 SCOPE

This document contains the description of the CLASFYG computer program. The program calculates coefficients to fit the model

$$G(t) = A \left(\frac{t}{t_o}\right)^{\alpha} e^{-\beta(t_o^2 - t^2)} \text{ for } t \geq t_o$$

and

$$G(t) = A \quad \text{for } t \leq t_o$$

where G is the greenness and A is the soil line, to the time trajectory of each pixel in a specified region of a segment. A disk file is written with a Universally formatted header record and line records recording the α, β, t_o and CHI-Square value for each pixel on the scan line.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this specification: AD 63-2457-3308-01 Transferring of Badhwar Software.

AD NAS 9-15200 Technical Memorandum Format Specifications for LACIE (Phase III) and Accuracy Assessment Computer Data Products.

3.0 SYSTEM DESCRIPTION

3.1 HARDWARE DESCRIPTION

The software for CLASFYG is operational on the IBM 3031 computer at Purdue.

3.2 CLASFYG PROCESSOR SYSTEM FLOWCHART

The system level data flow diagram is shown in figure 3.1.

The following system flowchart assumes the use of the EXEC file described in Appendix C.

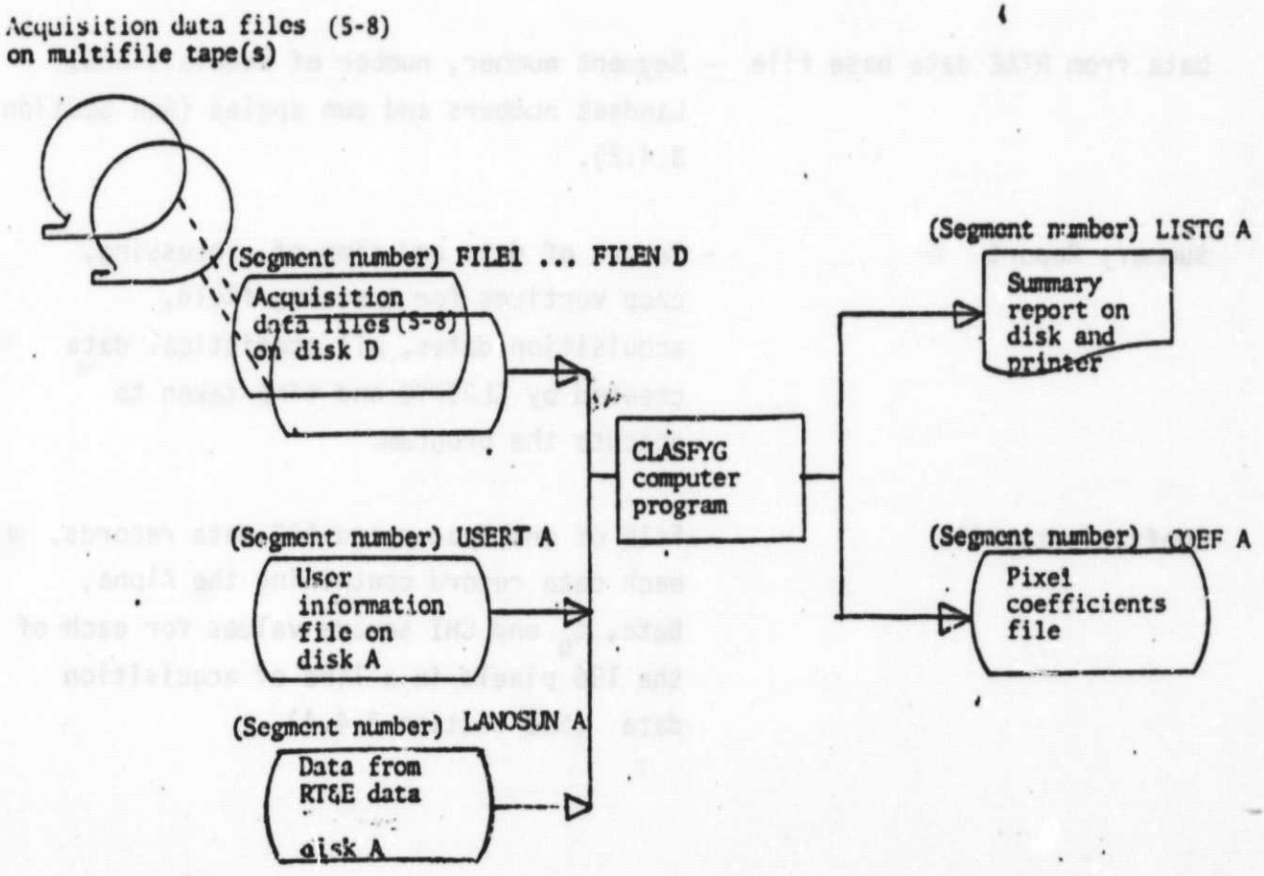


Figure 3.1

The inputs and outputs shown on Figure 3.1 are described briefly here. A more detailed description is given in section 3.4.

Acquisition data files - Header record and 4 channels of data for each of 5 to 8 acquisitions (See Section 3.4.3).

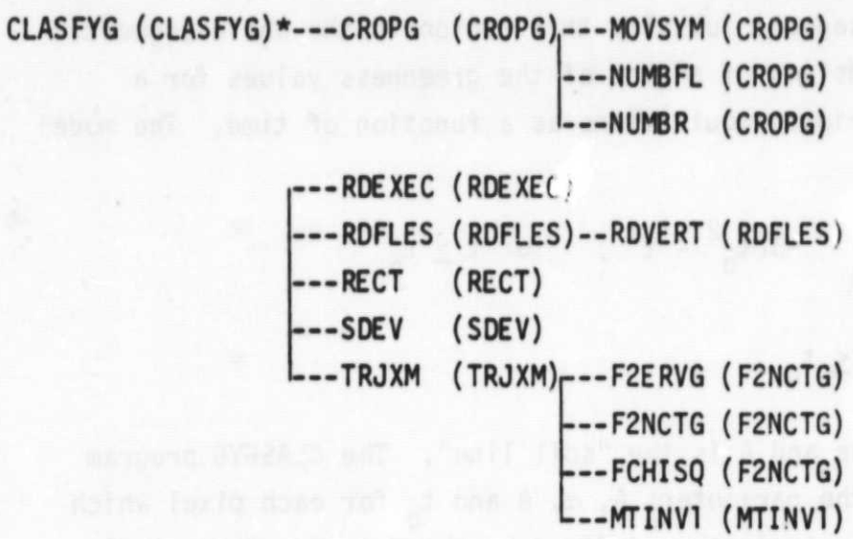
User information file - User information file supplying crop, initial guesses for greenness values, training field vertices and optional test field vertices (See Section 3.4.1).

Data from RT&E data base file - Segment number, number of acquisitions, Landsat numbers and sun angles (See Section 3.4.2).

Summary Report - Report of date and time of processing, crop vertices for training field, acquisition dates, all statistical data created by CLASFYG and time taken to execute the program.

Coefficients File - File of one header and 117 data records, each data record containing the Alpha, Beta, t_0 and CHI square values for each of the 196 pixels in a line of acquisition data (See Section 3.4.4).

CLASFYG Hierarchy Diagram



* Parentheses enclose the name of the file which contains the source statements for the named program which precedes them. For example,

PROGRAM (Source statement file name)

3.3 SOFTWARE DESCRIPTION

The CLASFYG program fits a model to the time trajectory of each pixel in a specified region of a segment (usually this region is the whole segment). The time trajectory consists of a plot of the greenness values for a particular pixel on various acquisitions as a function of time. The model is given by

$$G(t) = A \left(\frac{t}{t_o}\right)^{\alpha} e^{-\beta(t_o^2 - t^2)} \quad \text{for } t \geq t_o$$

and

$$G(t) = A \quad \text{for } t \leq t_o$$

where G is the greenness and A is the "soil line". The CLASFYG program produces estimates of the parameters A, α, β and t_o for each pixel which give the best fit to the trajectory defined by the data for that pixel. It also calculates a value for χ^2 which describes the goodness of fit.

The first stage of the processing consists of determining starting values for A, α, β and t_o which are subsequently used as starting points for fitting the model to pixels in the test area.

These starting values are determined using the data in a training field selected by the user and a set of initial "guesses" for these parameters also input by the user. The training field should be a field of the crop of major interest. Also during this first stage, an array SGMX is calculated which contains the standard deviations of the pixels in the training field for each acquisition used. These are used in weighting the acquisitions when fitting the model to the pixels in the test area.

The second stage of the processing consists of fitting the model to each pixel in the test area starting the iteration procedure for each pixel with the starting values calculated in phase I. When this is completed the final values for α, β, t_o and χ^2 for each pixel are output as a formatted disc file. Also a summary report is printed on the line printer.

3.4 FILE DESCRIPTION

3.4.1 USER INFORMATION FILE (Segment number) USERG A

The following records describe the name of the crop, the initial guesses for the coefficients for greenness and the training and test fields and allows the user to input any number of free-form comments.

In record types 1-5 the "keyword" is in columns 1-4 and any parameter or comment data is in columns 11 through 72. Numbers in a series are separated by commas; blanks are optional.

Record types 6 and 7 which describe the fields are blank in columns 1 through 10 and the field definition is in columns 11-72.

Record type 6 must follow the "*END" record and must preceed record type 7.

Record type 7 is optional, but if it exists it must follow record type 6.

1. "COMMENT" record
   EXAMPLE: COMMENT THIS IS AN EXAMPLE EXECUTION OF THE PROGRAM
   These records allow the user to enter any number of free-form comments.

2. "CROP" record
   EXAMPLE: CROP CORN
   This record specifies the 4 character name of the crop of interest. The name begins at the first non-blank character.

3. "GREENNESS" record
   EXAMPLE: GREENNESS 12.00, 11.50, 1.50, 1.50
   This record specifies the initial guesses for the A, Alpha, Beta and t_0 values of the crop in the training field.

4. "SUNANGLE" record

   EXAMPLE: SUNANGLE 45, 47, 51, 46, 42

   This record specifies the sun angles and is used only if the sun angles in the data base are wrong.

5. "*END" record

   This record specifies the end of the user information except for the definition of the training field and test field.

6. "TRAINING FIELD" record

   EXAMPLE: (1,1), (97,100), (97,120), (125,110), (100,100)

   This record specifies the coordinates of the corners of the training field. The format of the line is as follows:

   (1, 1) Dummy variable to be used for sample skip factor and line skip factor; not currently used.

   (X_1, Y_1) Upper leftmost corner of training field expressed as (sample, line).

   (X_2, Y_2) Upper rightmost corner of training field expressed as (sample, line).

   (X_3, Y_3) Lower rightmost corner of training field expressed as (sample, line).

   (X_4, Y_4) Lower leftmost corner of training field expressed as (sample, line).

7. "TEST FIELD" record

   EXAMPLE (1,1), (1,1), (196,1), (196,117), (1,117)

   This optional record specifies the coordinates of the corners of the test field. The default is the whole segment. The format is the same as the format for the training field record.

.2 ACQUISITION DATA FILES

: following records of the 5 to 8 acquisitions data files are input to the
\SFYG program and are read by RDFLES.

ese files each contain 4 channels of LANDSAT data for one acquisition.
an acquisition is used twice the corresponding file will be duplicated.
te that these files are all in universal format. Record 1 is read with
17(180A1) format statement; records 2-118 are read with a 5(180A1) format
tatement.

ecord	Bytes	Contents
	1-3060	Header record in universal format.
2	1-72	Filler.
	73-268	Gray level values for the 196 samples of and 1 for line 1.
	269-464	Gray level values for the 196 samples of band 2 for line 1.
	465-660	Gray level values for the 196 samples of band 3. for line 1.
	661-856	Gray level values for the 196 samples of band 4 for line 1.
3	1-856	Same data format as record 2; gray level values for bands 1-4 for line 2.
⋮		
N	1-856	Same data format as record 2; gray level values for bands 1-4 for line N-1.
⋮		
118	1-856	Same data format as record 2; gray level values for bands 1-4 for line 117.

3.4.3 DATA FROM RT&E DATA BASE LANOSUN FILE D

The following records describe the segment number, the number of acquisitions, and the date, sun angle and Landsat numbers for each acquisition.

Record	Bytes	Format	Contents
1	1-4	A4	Segment number.
2	1-4	I4	Number of acquisitions.
3	1-56	8(2X,A5)	Acquisition dates.
4	1-32	8I4	Sun angles.
5	1-32	8I4	Landsat numbers.

3.4.4 COEFFICIENTS FILE (Segment number) COEF A

The following records are output from the CLASFYG program:

Format

Record	Bytes	Format	Contents
1	1-3060	17(180A1)	Header record in Universal format.
2-118	3136	18(45A4)	Coefficients Alpha, Beta, t_o and CHI-square for the 196 pixels on 1 line.

Detailed format

Record	Words	Contents
1	1-765	Header record in Universal format.
2	1	Alpha value for pixel 1 in line 1 (computational integer).
2	2	Beta value for pixel 1 in line 1 (computational integer).
	3	t_o value for pixel 1 in line i (computational integer).
	4	CHI-square value for pixel 1 in line 1 (computational integer).
	⋮	
	1+N*4	Alpha value for pixel N+1 in line 1 (computational integer).
	2+N*4	Beta value for pixel N+1 in line 1 (computational integer).
	3+N*4	t_o value for pixel N+1 in line 1 (computational integer).
	4+N*4	CHI-square value for pixel N+1 in line 1 (computational integer).
	⋮	
2	781	Alpha value for pixel 196 in line 1 (computational integer).
	782	Beta value for pixel 196 in line 1 (computational integer).
	783	t_o value for pixel 196 in line 1 (computational integer).
	784	CHI-square value for pixel 196 in line 1 (computational integer).

Coefficients file (continued)

Record	Words	Contents
3	1-784	Same data format as record 2; Alpha, Beta, t_o and CHI-square values for 196 pixels of line 2.
:		
M+1	1-784	Same data format as record 2; Alpha, Beta, t_o and CHI-square values for 196 pixels of line M.
:		
118	1-784	Same data format as record 2; Alpha, Beta, t_o and CHI-square values for 196 pixels of line 117.

3.5 DETAILED SOFTWARE DESCRIPTION

3.5.1 CLASFYG

Purpose

CLASFYG uses a user determined training field in a full scene to determine trajectory coefficients for each band of radiance values to fit the model defined in section 1.0. These coefficients Alpha, Beta, t_o and CHI-square are written for each pixel to the output file described in section 3.4.3.

Linkages

CLASFYG calls CROPG, RDEXEC, CPTIME, RECT, SDEV, TRJXM and RDFLES.

Interface

Calling sequence:

Not applicable (an EXEC that can be used to call CLASFYG is described in Section 4.0).

Calling sequence parameters:

Not applicable.

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

Label	Variable	Element Position	Input/ Output	Description
/LINES/	LINENO	2	Ø	Line number.
/LINES/	IDATA(856,8)	3	I	Radiance values for a maximum of 8 channels.
/LINES/	NOACQS	4	Ø	Number of acquisitions.
/MISC/	NOACQ	1	I	Number of acquisitions.
/MISC/	ACQDT(8)	2	I	Acquisition dates.
/MISC/	KSEGM	3	I	Segment number.
/USER/	ICROP(4)	1	I	Name of crop.
/USER/	ZX(4)	2	I	Initial guesses for coefficients A, Alpha, Beta and t_o.
/USER/	SANGGG(8)	3	Ø	Sun angle correction factor.

Blank COMMON parameters:

None.

Inputs

Unit	Type	Description
7	Seq. data	Data from RT&E data base (See Section 3.4.3).
11	Seq. data	Acquisition data (See Section 3.4.2).
12	Seq. data	Acquisition data (See Section 3.4.2).
13	Seq. data	Acquisition data (See Section 3.4.2).
14	Seq. data	Acquisition data (See Section 3.4.2).
15	Seq. data	Acquisition data (See Section 3.4.2).
16	Seq. data	Acquisition data (See Section 3.4.2) optional.
17	Seq. data	Acquisition data (See Section 3.4.2) optional.
18	Seq. data	Acquisition data (See Section 3.4.2) optional.
21	Seq. data	User defined parameters (See Section 3.4.1).
30	Seq. data	Scratch file to reformat data.

Outputs

Unit	Type	Description
6	Report	Summary report.
8	Seq. data	Header and coefficients Alpha, Beta, t_o and CHI-square.
30	Seq. data	Scratch file to reformat data.

Storage requirement

Not applicable.

Description

CLASFYG calls CROPG to read the user specified parameters crop of interest and initial guesses for greenness coefficients A, Alpha, Beta, t_o.

CLASFYG calls RDFLES to read the header record and the parameters for the training field.

CLASFYG then calls CPTIME to get the current time and date and writes the report heading.

CLASFYG calculates the minimum and maximum boundaries for pixels in the test field, calculates days elapsed from the beginning of the year as a multiple of 100 for each acquisition date and sets a switch if an acquisition date is used twice.

The rectangular field bounded by the minimum and maximum pixel numbers and line numbers is then processed using the following steps:

A line of radiance values is read.
Each pixel in the field is checked to be in the training field.
The values for the pixels in the training fields are used to calculate a greenness value which is saved in a matrix.

When sufficient pixels have been accumulated, the mean and standard deviation are calculated for the test field.

CLASFYG calls TRJXM to calculate improved values for A, Alpha, Beta and t_o and a CHI-square value for the training field.

The header record is constructed from constants in the program, input from the user parameter file and the current date. The header record is written as the first record on the new classification file.

CLASFYG then evaluates the test field using the following steps:

A line of pixel data is read and the greenness value calculated TRJXM for every pixel on the line is called for each of the pixels.

The values for Alpha, Beta, t_o and the CHI-square are calculated by TRJXM for each pixel.

The line of pixels coefficients for Alpha, Beta and t_o and the CHI-square value is written to the coefficients file.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.2 SUBROUTINE CROPG

Purpose

CROPG reads and analyzes cards describing the initial guesses for A, alpha, beta and t_0 for the training field, the name of the crop and optionally the sun angle.

Linkages

CROPG is called by CLASFYG.

Interface

Calling sequence:

CALL CROPG (IERROR).

Calling sequence parameters:

Argument	Input/ Output	Description
IERROR	Ø	0 if no error occurs; 1 if error occurs.

Function value:

Not applicable.

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix.

Label	Variable	Element Position	Input/ Output	Description
/USER/	ICROP(4)	1	Ø	Name of crop of interest.
/USER/	ZX(4)	2	Ø	Initial guesses for A, Alpha, Beta and t_0.

Blank COMMON parameters:

None.

Inputs

Unit	Type	Description
21	Seq. data	User information file (See Section 3.4.1)

Outputs

None.

Storage requirement

Not applicable.

Description

Each record in the user defined parameter file is read and checked to have a valid control word in characters 1 through 4 defining the type of information in characters 11 through 80. If the control word is invalid, an error message is written and the error indicator is set nonzero; otherwise, the information is saved in the appropriate common block element.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.3 FUNCTION MOVSYM

Purpose

MOVSYM moves characters from array CARD to a series of left-justified words in array ITEMP.

Linkages

MOVSYM is called by CROPG.

Interface

Calling sequence:

```
KOUNT = MOVSYM (CARD, ITEMP).
```

Calling sequence parameters:

Argument	Input/ Output	Description
CARD	I	80 characters of user supplied data.
ITEMP	Ø	Array of left-justified words.

Function Value:

Name	Description
KOUNT	Count of symbols.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage Requirement

Not applicable.

Description

MOVSYM separates the characters in array CARD starting at character 11 and creates a series of left-justified words in array ITEMP.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.4 FUNCTION NUMBFL

Purpose

NUMBFL changes floating point numbers from characters in array CARD to computational numbers in arrary XNMVEC.

Linkages

NUMBFL is called by CROPG.

Interface

Calling sequence:

KOUNT = NUMBFL (CARD, XNMVEC).

Calling sequence parameters:

Argument	Input/ Output	Description
CARD	I	80 characters of user supplied data.
XNMVEC	Ø	Array of floating point computational numbers.

Function value:

Name	Description
KOUNT	Count of floating point numbers.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

NUMBFL separates the characters in array CARD starting at character 11 and creates a series of computational floating point numbers.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.5 RDEXEC

Purpose

RDEXEC reads the segment number, number of acquisitions, acquisition dates and Landsat numbers.

Linkages

RDEXEC is called by CLASFYG.

Interface

Calling sequence:

```
CALL RDEXEC.
```

Calling sequence parameters:

None.

Function value:

Not applicable.

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

Label	Variable	Element Position	Input/ Output	Description
/USER/	SUNANG(8)	3	Ø	Sun angle for each acquisition.
/MISC/	NOACQ	1	Ø	Number of acquisitions.
/MISC/	ACQDT(8)	2	Ø	Date for each acquisition.
/MISC/	KSEGM	3	Ø	Segment number.
/MISC/	LANDST(8)	5	Ø	Landsat number for each acquisition.

Blank COMMON parameters:

None.

Inputs

Unit	Type	Description
7	Seq. data	Data from RT&E data base (See Section 3.4.3).

Outputs

None.

Storage requirement

Not applicable.

Description

RDEXEC reads the segment number, number of acquisitions, acquisition dates and Landsat numbers.

Flowchart

Not applicable.

Listing

See Appendix D for listing.

3.5.6 SUBROUTINE RDFLES

Purpose

RDFLES reads 1) the header record and one set of vertices or 2) one line of radiance values.

Linkages

RDFLES is called by CLASFYT.

Interface

Calling sequence:

CALL RDFLES (ITYPE, IDATA, X, Y, IERROR).

Calling sequence numbers:

Argument	Input/ Output	Description
ITYPE	I	1 to read header from each acquisition file and field definition; 2 to read 1 line of radiance values from each acquisition file.
IDATA(856,8)	Ø	Line of radiance values from each acquisition file.
X(4)	IØ	Array of sample vertices defining field.
Y(4)	IØ	Array of line vertices defining field.
IERROR	IØ	0 - no error; 1 - error.

Function value:

Not applicable.

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

Label	Variable	Element Position	Input/ Output	Description
/LINES/	NOACQS	4	I	Number of acquisitions.
/LINES/	NXTLNE	1	IØ	Next line number.

Blank COMMON parameters:

None.

Inputs

Unit	Type	Description
11	Seq. data	Acquisition data for date 1 (See Section 4.3.2).
12	Seq. data	Acquisition data for date 2 (See Section 4.3.2).
13	Seq. data	Acquisition data for date 3 (See Section 4.3.2).
14	Seq. data	Acquisition data for date 4 (See Section 4.3.2).
15	Seq. data	Acquisition data for date 5 (See Section 4.3.2).
16	Seq. data	Acquisition data for date 6 (See Section 4.3.2). Optional.
17	Seq. data	Acquisition data for date 7 (See Section 4.3.2). Optional.
18	Seq. data	Acquisition data for date 8 (See Section 4.3.2). Optional.

Outputs

None.

Storage requirement

Not applicable.

Description

If ITYPE=1, RDFLES reads the header record from each of the universal formatted acquisition data tapes and the vertices for one field. If ITYPE=2, RDFLES reads one line of radiance values for each acquisition.

Flowchart

Not applicable.

Listing

See Appendix D.

3.5.7 SUBROUTINE RDVERT

Purpose

RDVERT reads one set of vertices.

Linkages

RDVERT is called by CLASFYG.

Interface

Calling sequence:

CALL RDVERT (XFLD, YFLD, IERROR).

Calling sequence parameters:

Argument	Input/ Output	Description
XFLD(4)	Ø	Array of sample vertices defining field.
YFLD(4)	Ø	Array of line vertices defining field.
IERROR	Ø	0 - no errors; 1 - error.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

Unit	Type	Description
21	Seq. data	User specified data file (See Section 4.3.1).

Outputs

None.

Storage requirement

Not applicable.

Description

RDVERT reads the vertices for one field.

Flowchart

Not applicable.

Listing

See Appendix D.

3.5.8 SUBROUTINE RECT

Purpose

RECT determines if a pixel lies within the specified vertices of a specific area.

Linkages

RECT is called by CLASFYT.

Interface

Calling sequence:

CALL RECT (LINE, PIXEL, YY, XX, ICOR).

Calling sequence parameters:

Argument	Input/ Output	Description
LINE	I	Current line number of pixel.
PIXEL	I	Current sample number of pixel.
YY(4)	I	Array of sample vertices defining field.
XX(4)	I	Array of line vertices defining field.
ICOR	Ø	0 if pixel in field; 1 if pixel not in field.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

The pixel is checked to be a boundary pixel and considered in the training field if it is a boundary pixel. If the pixel is within the minimum and maximum limits of the specified area, the angles created between lines drawn between the pixel and boundary pixels are calculated and summed. If the sum of the angles is 360; the pixel is considered to be in the specified field.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.9 SUBROUTINE SDEV

Purpose

SDEV calculates the mean and standard deviation of a vector.

Linkages

SDEV is called by CLASFYT.

Interface

Calling sequence:

```
CALL SDEV (X, N, XB, S).
```

Calling sequence parameters:

Argument	Input/ Output	Description
X(N)	I	Array of values.
N	I	Number of values in array X.
XB	Ø	Mean of values in array X.
S	Ø	Standard deviation of values in array X.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

SDEV calculates the mean (XB) and standard deviation (S) of vector X with N points.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.10 SUBROUTINE TRJXM

Purpose

TRJXM makes a least-square fit to a non-linear function to calculate coefficients for the curve.

Linkages

TRJXM is called by CLASFYG.

Interface

Calling sequence:

CALL TRJXM (X, Y, SIGMAY, NFILES, NTERMS, MODF, A DELTAA, SIGMAA, FLAMDA, YFIT, CHISQR).

Calling sequence parameters:

Argument	Input/ Output	Description
X	I	Array of Julian day/100 for acquisitions.
Y	I	Array of dependent variables.
SIGMAY	I	Array of errors on Y.
NFILES	I	Number of acquisitions.
NTERMS	I	Number of degrees of freedom.
MODE	I	Not used, was switch for calculation weight.
ESTIM	I,O	Array of coefficients A, Alpha, Beta and t_o.
DELTAA	I	Array of increments for A.
SIGMAA	O	Standard deviations.
FLAMDA	O	Proportion of gradient search.
YFIT	O	Array of fitted values.
CHISQR	o	Residual CHI square value.

Argument	Input/ Output	Description
IND	N/A	Not used.
WEIGHT	I	Array of weighting constants.
IPRINT	I	Print flag to use in debug.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

TRJXM calculates alpha and beta matrices, using the least-square method, for defining all parameters of the curve for the selected pixels in the training field.

The CHI-square value of the starting point is evaluated and the modified curvature matrix is inverted to find the new parameters.

The convergence depends on the CHI-square value and on the size of step.

If the CHI-square value increases, FLAMDA is increased and the process is re-initiated. If the CHI-square value descreases, the process is re-initiated until convergence is obtained. The parameters and uncertainties are evaluated.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.11 SUBROUTINE F2ERVG

Purpose

F2ERVG computes the derivatives of the function of each of the X values.

Linkages

F2ERVG is called by TRJXM.

Interface

Calling sequence:

CALL F2ERVG (X, I, ESTIM, DELTAA, NTERMS, DERIV).

Calling sequence parameters:

Argument	Input/ Output	Description
X	I	Array of time points for acquisition.
I	I	Current index in calling program.
ESTIM	IØ	Array of coefficients A, Alpha, Beta and t_o.
DELTAA	I	Array of increments for A.
NTERMS	I	Number of degrees of freedom.
DERIV	Ø	Array of derivatives with respect to parameters ESTIM.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

The radiance value and t_o are set positive. Y is calculated as the radiance value/t_o. If Y is less than or equal to 1, the 4 derivatives are set to very small numbers; otherwise, the derivatives are set to calculated values.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.12 FUNCTION FCHISQ

Purpose

FCHISQ calculates the CHI-square value per degree of freedom.

Linkages

FCHISQ is called by TRJFIT and CHNFIT.

Interface

Calling sequence:

```
GOODFT=FCHISQ (Y, SIGMAY, NPTS, NFREE, MODE, YFIT, WEIGHT).
```

Calling sequence parameters:

Argument	Input/ Output	Description
Y(NFILES)	I	Array of dependent variables.
SIGMAY(NFILES)	I	Array of errors on Y.
NPTS	I	Number of acquisitions.
NFREE	I	Number of degrees of freedom.
MODE	I	Not used.
YFIT(NFILES)	I	Array of fitted values.
WEIGHT(NFILES)	I	Array of weighting factors.

Function value:

Name	Description
GOODFT	CHI-square value per degree of freedom.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

FCHISQ calculates CHI-square value = $\xi(YFIT-Y)/SIGMA)^2$

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.13 FUNCTION F2NCTG

Purpose

F2NCTG calculates the value of DERIV from the radiance value, alpha and beta.

Linkages

F2ERVG is called by TRJXM.

Interface

Calling sequence:

CALL F2NCTG (X, I, ESTIM, IND).

Calling sequence parameters:

Argument	Input/ Output	Description
X(8)	I	Time array of Julian date/100 for each acquisition.
I	I	Index in calling program.
ESTIM(4)	I	Array of coefficients A, Alpha, Beta and t_o.
IND	N/A	Not used.
DELTAA(8)	I	Array incremental values.
NTERMS	I	Number of degrees of freedom.
DERIV(4)	Ø	Derivatives.

Function value:

Name	Description
YFIT(8)	Array of fitted values.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

F2NCTG calculates the value of the points on the curve from the values of alpha and beta and the current radiance value.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.14 SUBROUTINE MTINV1

Purpose

MTINV1 inverts a matrix of order NORDER.

Linkages

MTINV1 is called by TRJXM.

Interface

Calling sequence:

CALL MTINV1 (ARRAY, NORDER, DET).

Calling sequence parameters:

Argument	Input/ Output	Description
ARRAY(NORDER)	IØ	Matrix.
NORDER	I	Order of matrix.
DET	Ø	Determinate of matrix.

Function value:

None.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

MTINV1 uses the Gauss-Jordon reduction techniques.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.15 FUNCTION NUMBR

Purpose

NUMBR changes integers from character array CARD to computational numbers in array NUMVEC.

Linkages

NUMBR is called by CROPTM.

Interface

Calling sequence:

KOUNT = NUMBR (CARD, NUMVEC).

Calling sequence parameters:

Argument	Input/ Output	Description
CARD	I	80 characters of user supplied data in character format.
NUMVEC	Ø	Array of integer computational numbers.

Function value:

Name	Description
KOUNT	Number of computational integers

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

NUMBR separates the characters in array card starting at the 11th character and creates a series of computational integers.

Flowchart

Not applicable.

Listing

See Appendix D for program.

4.0 OPERATION

4.1 OPERATING DESCRIPTION

CLASFYG is operational on the IBM 3031 computer at LARS, West Lafayette, Indiana.

The CLASFYG program is one of the programs of the BADHWAR SYSTEM.

CLASFYG requires the use of a D disk which is assigned as a temporary disk and an E disk which is used to load LARS routines onto. The user therefore, must not assign a disk to his machine using either MODE E or MODE D. These disks will be assigned as needed.

Prior to executing the CLASFYG program the user must establish on his A disk a USER INFORMATION file as described in Section 3.4.1.

4.2 COMMANDS DESCRIPTION

To execute CLASFYG the user will enter the following series of commands which invoke the JOB CONTROL SOFTWARE. These commands are divided into two classes namely (1) FUNCTION commands and (2) PROGRAM commands. The FUNCTION commands, which perform all the functions except executing the program, are reusable, i.e., once they are invoked they remain in effect until reentered. The PROGRAM commands, which simply execute the program, must be reentered each time the program is to be executed.

The following list gives the commands required to execute the CLASFYG program. They are all FUNCTION commands except the PROGRAM command CLASFYG. These commands are to be given in the listed order.

START

CLASFYG.....

END

The following sections describe each of the commands in detail. Input fields are separated by blanks. If more than one word is required to describe an input field, the description is enclosed in pointed brackets <>. If an input is optional the field is enclosed in square brackets []. Do not include these explanatory characters <> [] when actually submitting input to the computer. To enter a command the user types one input per defined input field and separates each field with a blank.

4.2.1 START

The START command spools the user's console file. The use of this command along with the END command will provide a listing of all information appearing on the user console file. (If running an interactive job this is the terminal.) If running a batch job this is a system defined device. The START command is invoked by the user typing the following:

START

4.2.2 CLASFYG

The CLASFYG command is a PROGRAM command is used to invoke the CLASFYG program. All landsat input data is from the LARS RT&E Data Base and a series of programs is required to perform the necessary interface. The following illustrates this software flow.

```
                        ..RTEER (LARS ROUTINE)
                        :
CLASFYG.....LCGINF.....:.SEGALL (LARS ROUTINE)
                        :
                        ..TSRTHS....IVALUE
```

For a detailed description of the above JOB CONTROL SOFTWARE see appendix C.

The CLASFYG command must not be given unless the user has established a user's file on his A disk under the file description <SEGMENT NUMBER> USERG as described in Section 3.4.1. Furthermore, the SEGMENT NUMBER must contain all 4 digits of the segment. For example: segment 0882 dictates that the USER INFORMATION file be named:

0882 USERG A

The CLASFYG command is invoked by the user typing the following.

CLASFYG <ACQ.#1> <ACQ.#2> <ACQ.#3> <ACQ.#4> <ACQ.#5>...<ACQ.#8>

As described in Section 3.4.2, the CLASFYG program requires the user to specify a minimum of 5 segment acquisitions as input and a maximum of 8 may be specified.

The classification file output from an execution of CLASFYG is written to a file named <SEGMENT NUMBER> COEF A. The program inputs acquired from the LARS Data Base and the USER INFORMATION file is spooled to the HOUSTON printer.

4.2.3 END

This command closes the user's console file and causes a spooled copy to be sent to the HOUSTON printer. This command has no effect if the START command was not previously issued. The END command is invoked by the user typing the following:

```
END
```

4.3 OPERATING EXAMPLE

For our example we assume that the user has established on his A disk the required USER INFORMATION file. In addition since our example deals with an execution using segment 882 the USER INFORMATION file must be established under the filename 0882 and filetype USERG.

COMMAND	EXPLANATION OR ACTION TAKEN
START	Spools the console file.
CLASFYG 0882 78150 78159 78186 78313 78221 78231 78267	Executes the CLASFYG using 7 acquisitions of segment 882.
END	Closes the user's console file and spools the file tothe HOUSTON printer.

APPENDIX A

COMMON BLOCK /LINES/

NXTLNE	Not currently used.
LINENO	Current line number.
IDATA(856,8)	Acquisition data.
NOACQS	Number of acquisitions.

COMMON BLOCK /MISC/

NOACQ	Number of acquisitions.
ACQDT(8)	Acquisition dates stored left justified in double precision word.
KSEGM	Segment number stored as 4 character word.
LANDST(8)	Landsat numbers.

COMMON BLOCK /USER/

ICROP(4)	Name of crop of interest.
ZX(4,10)	Initial guesses for A, Alpha, Beta and t_o for greenness.
SANGGG(8)	Sun angles for acquisitions.

APPENDIX B

CLASFYG Variable Definitions

Variable	Definition
ABS	ABSOLUTE VALUE FUNCTION
ACQDT	ACQUISITION DATES IN ALPHANUMERIC CHARACTER
ACQDTB	ACQUISITION DATES IN 1 CHARACTER WORDS
ALPHBF	BUFFER FOR ALPHA VALUES
ANG	TEMP VALUE, USED IN SUN ANGLE CORRECTION
BETABF	BUFFER FOR BETA VALUES AFTER TEST PIXEL CALL TO TRJXM
BSEG	SEGMENT NUMBER IN CHARACTERS
CHIBUF	BUFFER FOR CH SQ. VALUES
CHISQ	FP CHI SQ. VALUE CALC. BY TRJXM FOR CURRENT TEST PIXEL
CHNVAL	HOLD AREA FOR CHANNEL RADIANCE VALUES
CLNDST	CONSTANT FOR CONVERTING LANDSAT 3 DATA
CPTIME	SUBROUTINE TO RETURN TODAY'S DATE AND TIME
DBUF	NOT USED
HDR	BUFFER FOR HEADER
IALPHA	2ND APPRX VALUE, ALPHA, CALC BY TRJMX FOR TEST PIXEL
IBETA	3RD APPRX VALUE, BETA, CALC BY TRJMX FOR CURRENT TEST PIXEL
ICHISQ	INTGR CHI SQ. VALUE CALC. FOR CURRENT TEST PIXEL BY TRJXM
ICOR	RETURN PARAMETER FROM RECT, 0=PIXEL IN FLD, 1=PIXEL NOT IN FLD
ICPTIM	INITIAL CP TIME IN HUNDREDTHS OF SECONDS
ICROP	CROP IN ALPHANUMERIC CHARACTERS
ICUT	NOT USED
IDATA	BUFFER AREA FOR LINES OF RADIANCE VALUES
IDATE	ACQUISITION DATES IN INTEGER FORMAT
IDAY	DAY IN CHARACTER FORMAT
IDIFFC	ELAPSED CP TIME IN HUNDREDTHS OF SECONDS
IDIFFV	ELAPSED VIRTUAL CP TIME IN HUNDREDTHS OF SECONDS
IDUPDT	INDEX TO DUPLICATE DATE, ZERO IF NO DUPLICATES
IHOLD1	ARRAY OF 1 CHARACTER WORDS
IHOLD4	ARRAY OF 4 CHARACTER WORDS
II	INDEX
ILIM	SET, BUT NOT USED
IMON	MONTH IN CHARACTER FORMAT
INCRE	TEMP VALUE USED IN UNPACKING PIXELS
INDEX	INDEX TO LANDSAT CORRECTION FACTOR
IPIXEL	CURRENT PIXEL
ITO	4TH APPRX VALUE, TO, CALC FOR CURRENT TEST PIXEL BY TRJXM
ITYPE	INPUT TO SUBR. RDFLE TO READ HEADER(1) OR RADIANCE VALUES(2)
IVCPTM	INITIAL VIRTUAL CP TIME
IYEAR	2 CHARACTER YEAR

VARIABLE	DEFINITION
JM	INDEX
JSEGM	SEGMENT NUMBER AS 1 CHARACTER WORDS
KBB	INDEX
KBLANK	CONSTANT OF BLANK
KEQUAL	CONSTANT OF EQUAL MARK
KORNER	INDEX TO VERTICES FOR TEST FIELD
KSEGM	SEGMENT NUMBER AS 4 CHARACTER WORDS
KURACQ	CURRENT ACQUISITION
KURCHN	CURRENT CHANNEL
KURPXL	CURRENT PIXEL
LA	INDEX
LANDST	ARRAY OF LANDSAT NUMBERS FOR ACQUISITIONS
LIMIT	MAX CALLS TO TRJXM FOR EACH PIXEL
LINENO	CURRENT LINE NUMBER
LMAX	MAXIMUM LINE NUMBER FOR BOTH FIELDS
LMIN	MINIMUM LINE NUMBER FOR BOTH FIELDS
LOC	TEMP VALUE USED IN UNPACKING RADIANCE VALUES
MAXPXL	MAXIMUM PIXEL
MINPXL	MINIMUM PIXEL
MODE	NOT USED, ORIGINALLY USED TO SELECT WEIGHTING METHOD
NCPTIM	ENDING CP TIME IN HUNDREDTHS OF SECONDS
NMODE	CONSTANT OF 0, USED IN CALL TO TRJXM
NOACQ	NUMBER OF ACQUISITIONS
NOACQS	NUMBER OF ACQUISITIONS
NOACQS	NUMBER OF ACQUISITIONS
NOPXLS	NUMBER OF PIXELS
NOTRPX	CURRENT NUMBER OF PIXELS IN TRAINING FIELD
NTERM	NUMBER OF DEGREES OF FREEDOM (4)
NTIME	CURRENT DATE, NOT USED
NVCPTM	ENDING VIRTUAL CP TIME IN HUNDREDTHS OF SECONDS
NXTLNE	NOT USED
PELTA	8TH PARAMETER TRJXM, CAN BE USED IN NON-ANALYTIC DIFFERENTIATION
QELTA	NOT USED
QFTX	11TH PARAMETER IN CALLING SEQUENCE TO TRJXM
RDFLES	SUBROUTINE TO READ FILE DATA
RECT	SUBROUTINE TO DETERMINE IF PIXEL IN USER DEFINED FIELD
SANG	SUN ANGLE ARRAY
SANGGG	USER INPUT SUN ANGLE
SDEV	SUBROUTINE TO CALCULATE MEAN AND ST. DEV.
SETUPG	SBUROUTINE TO READ USER INPUT DATA
SGMATR	ST. DEV. GREEN TRAIN FLD, INDEXED BY ACQ. NO. USED FOR TEST FLD
SIGMA	ERROR ON PARAMETERS FOR RETURN FROM TRJXM
SIGMAG	ST.DEV. FOR TRAINING FIELD
SIN	SINE FUNCTION
STIME	STARTING TIME OF DAY IN CHARACTERS FOR HEADER

VARIABLE DEFINITION

TIMECP	ELAPSED CP TIME IN MINUTES
TIMEVR	ELAPSED VIRTUAL CP TIME IN MINUTES
TODAY	TODAY'S DATE
TRAINA	1ST APPRX VALUE CALC IN TRJXM FOR TRAIN FLD, USED IN TEST TRJXM
TRALPH	2ND APPRX VALUE CALC. IN TRJXM FOR TRAIN FLD, USED IN TEST TRJXM
TRBETA	3RD APPRX VALUE CALC IN TRJXM FOR TRAIN FLD, USED IN TEST TRJXM
TRJXM	SUBROUTINE TO CALCULATE FIT ON TRAINING FLD AND THEN TEST PIXEL
TRTO	4TH APPRX VALUE CALC IN TRJXM FOR TRAIN FLD, USED IN TEST TRJXM
TZERO	4TH APPRX VALUE, TO, CALC FOR CURRENT TEST PIXEL BY TRJXM
TOBUF	BUFFER FOR TO ARRAY AFTER TEST PIXEL CALLS TO TRJXM
VERTPX	USER SUPPLIED LINE VERTICES
WEIGHT	1./ SIGMAY**2, WEIGHT FACTOR USED BY STATISTICAL ROUTINES
XBETA	FP 2ND APPRX VALUE CALC. BY TRJMX FOR CURRENT TEST PIXEL
XCHIN	INITIALLY 200, THEN CURRENT VALUE OF CHI SQ AFTER CALLS TO TRJXM
XDAY	FL. PT. VALUES FOR DAYS OF YEAR / 100.
XDIF	FL. PT. TEMP HOLD AREA
XGREEN	GREENNESS VALUES FOR TRAIN PIXELS
XISQR	CHI SQ. AFTER BOTHS CALLS TO TRJXM
XLAMDA	INCRE PARAMETER, SET 1.E-03 1ST CALL TO TRJXM, MODIFIED BY TRJXM
XLINE	FP USER SUPPLIED LINE NUMBER FOR CALL TO RECT
XMEAN	MEAN OF GREENNESS VALUES FOR TRAINING FIELD
XMNTRN	ARRAY OF MEANS FOR TRAINING FIELD ACQUISITIONS
XPIXEL	FP USER SUPPPLIED PIXEL NUMBER FOR CALL TO RECT
XPIXGR	ARRAY OF GREENNESS VALUES FOR PIXELS
XTH	TEMP
XTOL	TOLERANCE FACTOR USED FOR TRJXM FIT CHECK
VERTLN	USER SUPPLIED PIXEL VERTICES
YGREEN	GREENNESS VALUES FOR TRAINING FIELD

APPENDIX C

ACCEPTED OFF

CLASFYG EXEC

HISTORY

CAROLINE HOUSTON	LARSCO	11/01/80	ORIGINAL EXEC
MARY A THOMPKINS	LARSCO	01/29/81	DEBUG

PURPOSE

THIS EXEC EXECUTES A FORTRAN PROGRAM (LCGINF) WHICH ACCESSES THE LARS USER DATA BASE FOR ACQUISITION REQUESTED. LISTING WRITES AN EXEC (CCFILES) WHICH CREATES DATA FILES FOR EACH ACQ. AFTER EXECUTION OF THE ABOVE THE CLASFYG PROGRAM IS LOADED.

ARGUMENTS TO THE EXEC ARE AS FOLLOWS:

ARGUMENT NO.	DESCRIPTION
&1	SEGMENT NUMBER
&2	ACQ. NUMBER
&3	ACQ. NUMBER
&4	ACQ. NUMBER
&5	ACQ. NUMBER
&6	ACQ. NUMBER
&7	ACQ. NUMBER
&8	ACQ. NUMBER
&9	ACQ. NUMBER

*ARGUMENTS: 5 ACQ. NUMBERS ARE REQUIRED. THE PROGRAM WILL ACCEPT 9.

FILE DEFINITION/DESCRIPTION FOR ALL FILES USED IN THESE PROGRAMS AND EXECS ARE AS FOLLOWS:

UNIT	DESCRIPTION
2	LISTING EXEC
3	TERMINAL READ
4	LARS SCALL ROUTINE
5	TERMINAL WRITE LARS ERROR MESSAGES
6	PRINTER FILE STORED IN FILE A1 LISTG
7	INPUT FILE-LANDSAT NUMBER EACH ACQ
8	COEFFICIENTS FILE STORED IN A1 COEF
9	USED IN HARDWAR SYSTEM GROUND TRUTH
10	USED IN HARDWAR SYSTEM CLASS/CLUSTER
11	A1 FILE1 0 -- RADIANCE FILE1
12	A1 FILE2 0 -- RADIANCE FILE2
13	A1 FILE3 0 -- RADIANCE FILE3
14	A1 FILE4 0 -- RADIANCE FILE4
15	A1 FILE5 0 -- RADIANCE FILE5
16	A1 FILE6 0 -- RADIANCE FILE6
17	A1 FILE7 0 -- RADIANCE FILE7
18	A1 FILE8 0 -- RADIANCE FILE8
19	HARDWAR SYSTEM
20	PRIMARY STATION -- STORED IN CODOC FILE A
21	A1 USERG -- USER CONTROL PARAMETER FILE
22	GT FILE RECALL FILE
23	CLASS FILE RECALL FILE
24-29	HARDWAR SYSTEM
30	RESERVED UNIT

EXCEPTIONS

THE FOLLOWING ERROR CONDITIONS CAUSE PROGRAM TERMINATION:

1. NO TERMINAL OR DISK AVAILABLE.
2. INCORRECT INPUT PARAMETERS INPUT TO PROGRAM.
3. ERRORS IN ACCESSING LARS DATA BASE.

PROCEDURE

ASSIGN A [illegible] SPECIFY FILE [illegible] ASSIGN [illegible]

```
*
     &SPACE 1
     &TYPE CLASIYG &1 &2 &3 &4 &5 &6 &7 &8 &9
     TAG DEV PRINTER2 NOHISTORY
     SPOOL PRINTER CONT NOHOLD TO RSCS
     GLOBAL TXTLIB CMSLIB FORTVSAM
     CP QUERY VIRTUAL 192
     &IF &RETCODE NE 0 &TYPE NO TEMP DISK ACCESSED.
     &IF &RETCODE NE 0 &EXIT 1
*
*
* GET LARS DISK WHICH CONTAINS PFSF DATA BASE
     GETDISK DSCDISK 192 F
*
*
* FILEDEF TERMINAL AND FILEDEF EXEC FILE WRITTEN DURING RUN.
*
     FILEDEF * TERM (PERM
     FILEDEF * TERM (PERM
     FILEDEF FT02F001 DISK LOGINFO EXEC D (RECFM FB LRECL 80 BLKSIZE 80 PERM
     FILEDEF FT07F001 DISK LARSSAM FILE D (RECFM FB LRECL 80 BLKSIZE 80 PERM
     FILEDEF FT20F001 DISK CODOC FILE A (RECFM FB LRECL 80 BLKSIZE 80 PERM
*
*
* CHECK FOR ACCEPTABLE PARAMETER COUNT
*
     &IF &INDEX LT 2 &GOTO -NO
     &IF &INDEX LE 9 &GOTO -TRUE
-NO  &TYPE TOO FEW-TOO MANY PARMETS
     &EXIT 2
*
-TRUE     &ACCOUNT = &INDEX - 1
*
*
* IF LENGTH OF &1 (SEGMENT NUMBER) < 4 CONCATENATE 0.
*
-LOP &SEGLNG = &LENGTH &1
     &IF &SEGLNG EQ 4 &SKIP 3
     &1 = ACONCAT 0 &1
     &SEGLNG = &SEGLNG + 1
     &GOTO -LOP
*
*
* STACK ALL EXEC INPUT TO ALLOW LOGINF TO ACQUIRE TAPE NUMBERS
* FILE NUMBERS,SUBFILE NUMBERS,AND SUB ARRAYS FOR EACH ACQ.
*
     &STACK &ACCOUNT
     &COMPT = 0
     &LOOP 2 &INDEX
     &COMPT = &COMPT + 1
     &STACK &COMPT
*
*
* LOAD FORTRAN PROGRAM WHICH WILL ACCESS LARS PFSF DATA BASE.
* PROGRAM WILL WRITE LOGINFO EXEC D. FILES FOR EACH ACQ.WILL BE
* TRANSFERRED FROM TAPE TO DISK BY LOGINFO EXEC.FILE DEF FOR FILES
* WILL BE DONE.
*
     LOAD LOGINF (CALLIB STEPLIB (MAP CLEAR START
     RET 1 (NOT
     EXEC LOGINFO D
     &BEGIN WAS &TIME
     &IF &RETCODE NE 0 &EXIT 3
*
*
* FILE DEF FOR USER DEFINED CONTROL FILE AND OUTPUT FILE.
*
     FILEDEF &TAPEIN DISK A1 FIXED (LRECL 132 BLKSIZE 132 PERM
     FILEDEF * DISK A1 CODE FIXED (LRECL 80 BLKSIZE 3120 PERM
     FILEDEF FT07F001 DISK A1 FIXED (LRECL 80 BLKSIZE 80 PERM
*
*
     LOAD CLASIYG (CLEAR START MAP AM
*
*
* PRINT REPORT
*
     PRINT CODOC FILE A*
```

C-2

```
FILE: CLASEYG  EXEC     A   (AUS / PURDUE UNIVERSITY
      PRINT *) (LIST
      SPOOL PUNCH* CLOSE
      RETT
&END
```

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

```
                C     PROGRAM LCGINF                                                        LCG00010
                CCCCC                                                                       LCG00020
                CCCCC                    GET INFO FROM LARS/WRITE EXEC FOR CLSFYG          LCG00030
                CCCCC ------------------------------------------------------------------   LCG00040
                CCCCC                                                                       LCG00050
                CCCCC HISTORY                                                               LCG00060
                CCCCC -------                                                               LCG00070
                CCCCC                                                                       LCG00080
                CCCCC     M A TOMPKINS      LEMSCO      01/27/81      ORIGINAL CODE         LCG00090
                CCCCC                                                                       LCG00100
                CCCCC METHOD                                                                LCG00110
                CCCCC ------                                                                LCG00120
                CCCCC                                                                       LCG00130
                CCCCC     READ NUMBER OF ACQS.,SEGMENT NUMBER,AND ACQ. NUMBERS.ACCESS THE   LCG00140
                CCCCC     LARS RT&E DATA BASE. IF SUCESSFUL WRITE LSTINFO EXEC TO MOUNT     LCG00150
                CCCCC     TAPES AND TRANSFER DATA TO DISC FILES. FILEDEF ALL NEW DISK FILES.LCG00160
                CCCCC     WRITE INPUT FILE CONSISTING OF NUMBER OF ACQ,SATELITE NUMBER      LCG00170
                CCCCC     AND SUN ANGLES FOR EACH ACQUISITION. WRITE SEGMENT NUMBER AND     LCG00180
                CCCCC     ACQUISITION NUMBERS FOR DOCUMENTARY PURPOSES.                     LCG00190
                CCCCC                                                                       LCG00200
                CCCCC MACHINE DEPENDENT CODE                                                LCG00210
                CCCCC ----------------------                                                LCG00220
                CCCCC                                                                       LCG00230
                CCCCC     NONE.                                                             LCG00240
                CCCCC                                                                       LCG00250
                CCCCC EXTERNAL REFERENCES                                                   LCG00260
                CCCCC -------------------                                                   LCG00270
                CCCCC                                                                       LCG00280
                CCCCC     SEGALL    LARS ROUTINE TO ACQUIRE INFO FROM RT&E DATA BASE       LCG00290
                CCCCC     TSRTHS    TAGSORT USING HIBBARD'S SHELL SORT                     LCG00300
                CCCCC     RTEERR    LARS ERROR ROUTINE                                     LCG00310
                CCCCC                                                                       LCG00320
                CCCCC EXCEPTIONS                                                            LCG00330
                CCCCC ----------                                                            LCG00340
                CCCCC                                                                       LCG00350
                CCCCC     IF IERR <> 0 OR 4 WRITE ERROR MESSAGE AND WRITE EXEC              LCG00360
                CCCCC     TO TERMINATE PROGRAM.                                             LCG00370
                CCCCC                                                                       LCG00380
                CCCCC LOCAL DECLARATIONS                                                    LCG00390
                CCCCC ------------------                                                    LCG00400
                C                                                                           LCG00410
ISN 0002        C     INTEGER INDEX(89,112)                                                 LCG00420
                C                                  INFO ON EACH ACQ REQUESTED FORM DATA BASE LCG00430
ISN 0003        C     INTEGER LSEGNO                                                        LCG00440
                C                                  LANDSAT SEGMENT NUMBER                   LCG00450
ISN 0004        C     INTEGER NACQRQ                                                        LCG00460
                C                                  NUMBER OF ACQUISITION REQUESTED          LCG00470
ISN 0005        C     INTEGER LSEGTP(64)                                                    LCG00480
                C                                  TEMP FOR TESTING OF LSEGAQ               LCG00490
ISN 0006        C     INTEGER NUMACQ                                                        LCG00500
                C                                  NO. OF ACQ REQUESTED: NO. OF ACQ. FOUND. LCG00510
ISN 0007        C     INTEGER LSEGAQ(64)                                                    LCG00520
                C                                  LANDSAT SEG. ACQ. DATE                   LCG00530
ISN 0008        C     INTEGER IERR                                                          LCG00540
                C                                  RT&E DATA BASE ERROR CODE                LCG00550
ISN 0009        C     INTEGER LACQRQ(5,10)                                                  LCG00560
                C                                  LANDSAT INFO REQUESTED BY USER           LCG00570
ISN 0010        C     INTEGER NACQRQ                                                        LCG00580
                C                                  NUMBER OF ACQ. REQUESTED                 LCG00590
ISN 0011        C     INTEGER INTAG(10)                                                     LCG00600
                C                                  ORDER TAGS (INDEX)                       LCG00610
ISN 0012        C     INTEGER LSTAPE                                                        LCG00620
                C                                  LAST TAPE NUMBER                         LCG00630
ISN 0013        C     INTEGER NFLSKP                                                        LCG00640
                C                                  NUMBER OF FILES TO SKIP                  LCG00650
ISN 0014        C     INTEGER IUNIT                                                         LCG00660
                C                                  UNIT NUMBER FOR FILE DEFINITION          LCG00670
                C                                                                           LCG00680
```

```
                C
                C PROCEDURE
                C ---------
                C
                C
                C READ FROM STACK THE NUMBER OF ACQ NEEDED,SEGMENT NUMBER, AND
                C SPECIFIC ARQUISITIONS SOUGHT.
                C
                C
                C START WRITING LSTINFO EXEC.
                C
ISN 0015                WRITE(2,90)
ISN 0016             90 FORMAT(' &CONTROL OFF')
                C
ISN 0017                READ(3,100)NUMACQ
ISN 0018            100 FORMAT(I1)
                C
ISN 0019                READ(3,110)LSEGNO
ISN 0020            110 FORMAT(I4)
                C
ISN 0021                DO 105 I = 1,NUMACQ
ISN 0022                   READ(3,120)LSEGAQ(I)
ISN 0023            105 CONTINUE
                C
ISN 0024            120 FORMAT(I5)
                C
                C
                C WHEN CALLING LARS SEGALL ROUTINE THE ARRAY OF ACQ MUST NOT
                C CONTAIN ANY DUPLICATE ACQ NUMBERS. THE LSEGTP ARRAY CONSIST
                C OF UNIQUE ACQ NUMBERS.NACQRQ IS THE COUNT OF UNIQUE NUMBERS.
                C
ISN 0025                NACQRQ = 0
ISN 0026                DO 140 K = 1,NUMACQ
ISN 0027                   DO 130 J = 1,NUMACQ
ISN 0028                      IF(LSEGAQ(K).EQ.LSEGTP(J)) GO TO 140
ISN 0030            130    CONTINUE
ISN 0031                   NACQRQ = NACQRQ + 1
ISN 0032                   LSEGTP(NACQRQ) = LSEGAQ(K)
ISN 0033            140 CONTINUE
                C
                C
                C CALL LARS SEGALL ROUTINE FOR ALL INFO ON THE REQUESTED ACQ.
                C BECAUSE OF THE POSSIBILITY OF DUPLICATE INFO ON SOME SEGMENTS
                C AND THE POSSIBILITY THAT THE ORDER OF THE INFO RETURNED MAY BE
                C DIFFERENT FROM REQUESTED SEG ORDER A SEARCH IS REQUIRED TO ORDER
                C AND DELETE IF ANY DUPLICATE INFO.
                C
ISN 0034                CALL SEGALL(LSEGNO,NACQRQ,LSEGTP,INDEX,IERR,4,'E')
                C
                C
                C CHECK IERR MESSAGE IF <> 0 OR 4 CALL LARS RTEERR ROUTINE FOR
                C ERROR MESSAGE.
                C
ISN 0035                IF(IERR.EQ.0.OR.IERR.EQ.4) GO TO 300
ISN 0037                CALL RTEERR(IERR,5)
ISN 0038                WRITE(2,250)
ISN 0039            250 FORMAT(' &STACK 1',/,' &EXIT')
ISN 0040                GO TO 900
                C
ISN 0041            300 WRITE(2,310)
ISN 0042            310 FORMAT(' &STACK 0')
                C
                C
                C SEARCH INFO RETURNED FROM DATA BASE. STORE INFO INTO LACQRQ
                C ARRAY .
                C
ISN 0043                DO 450 J = 1,NUMACQ
ISN 0044                   DO 370 I = 1,NACQRQ
ISN 0045                      ITEM = I
ISN 0046                      IF(INDEX(12,I).EQ.LSEGAQ(J)) GO TO 400
ISN 0048            370    CONTINUE
ISN 0049            400    LACQRQ(1,J) = INDEX(1,ITEM)
ISN 0050                   LACQRQ(2,J) = INDEX(2,ITEM)
ISN 0051                   LACQRQ(3,J) = INDEX(43,ITEM)
ISN 0052                   LACQRQ(4,J) = INDEX(57,ITEM)
ISN 0053                   LACQRQ(5,J) = INDEX(1,ITEM)*1000 + INDEX(2,ITEM)
ISN 0054            450 CONTINUE
                C
```

```
                C                                                                       LCG01520
                CC SORT INTAG ACCORDING TO SORT KEY MADE BY CONCATNATING TAPE#FILE#      LCG01530
                C                                                                       LCG01540
ISN 0055            CALL TSRTHS(INTAG, LACQRQ,5,NUMACQ,5,'A')                           LCG01550
                C                                                                       LCG01560
                CC                                                                      LCG01570
                CC WRITE PORTION OF EXEC TO TRANSFER TAPE FILES TO DATA FILES           LCG01580
                CC IF AN ACQ IS REUSED THE DISK FILE IS DUP.                            LCG01590
                C                                                                       LCG01600
ISN 0056            LSTAPE = 0                                                          LCG01610
ISN 0057            DO 600 I = 1,NUMACQ                                                 LCG01620
ISN 0058              IF(LSTAPE.EQ.LACQRQ(1,INTAG(I)))GO TO 520                         LCG01630
                C                                                                       LCG01640
                CC                                                                      LCG01650
                CC NO TAPE IS MOUNTED OR A NEW ONE IS TO BE MOUNTED                     LCG01660
                C                                                                       LCG01670
ISN 0060            WRITE(2,500)LACQRQ(1,INTAG(I))                                      LCG01680
ISN 0061      500   FORMAT(' TAPMOUNT ',I4,' TAP1 RG 1600')                           LCG01690
ISN 0062            WRITE(2,510)                                                        LCG01700
ISN 0063      510   FORMAT(' TAPE REW(TAP1')                                          LCG01710
ISN 0064            NFLSKP = LACQRQ(2,INTAG(I))-1                                       LCG01720
                C                                                                       LCG01730
                CC                                                                      LCG01740
                CC TAPE IS MOUNTED CONTINUE WRITING EXEC.                               LCG01750
                C                                                                       LCG01760
ISN 0065      520   IF(NFLSKP.GT.0)WRITE(2,530)NFLSKP                                 LCG01770
ISN 0067      530   FORMAT(' TAPE FSF ',I4)                                           LCG01780
ISN 0068            IF(NFLSKP.GE.0)WRITE(2,540)                                         LCG01790
ISN 0070      540   FORMAT(' FILEDEF INMOVE TAP1 (BLOCK 3060 RECFM U PERM')           LCG01800
ISN 0071            IF(NFLSKP.LT.0)WRITE(2,550)LSEGNO,INTAG(I-1)                        LCG01810
ISN 0073      550   FORMAT(' FILEDEF INMOVE DISK ',I5,' FILE',I1,                     LCG01820
                   &          ' D(LRECL 3060 BLOCK 3060 RECFM U PERM')                LCG01830
ISN 0074            WRITE(2,560)LSEGNO,INTAG(I)                                         LCG01840
ISN 0075      560   FORMAT(' FILEDEF OUTMOVE DISK ',I5,' FILE',I1,                    LCG01850
                   &          ' D(LRECL 3060 BLOCK 3060 RECFM U PERM')                LCG01860
ISN 0076            WRITE(2,580)                                                        LCG01870
ISN 0077      580   FORMAT(' MOVEFILE')                                               LCG01880
ISN 0078            LSTAPE = LACQRQ(1,INTAG(I))                                         LCG01890
ISN 0079            NFLSKP = LACQRQ(2,INTAG(I+1))-(LACQRQ(2,INTAG(I))+1)              LCG01900
ISN 0080      600 CONTINUE                                                              LCG01910
                C                                                                       LCG01920
                CC                                                                      LCG01930
                CC WRITE FILEDEF FOR THE ABOVE FILES                                    LCG01940
                C                                                                       LCG01950
ISN 0081            DO 620 I = 1,NUMACQ                                                 LCG01960
ISN 0082              IUNIT = INTAG(I) + 10                                             LCG01970
ISN 0083              WRITE(2,610)IUNIT,LSEGNO,INTAG(I)                                 LCG01980
ISN 0084      610     FORMAT(' FILEDEF FT',I2.'F001 DISK ',I5,' FILE',                  LCG01990
                   &          I1,' D(LRECL 3060 BLOCK 3060 RECFM U PERM')             LCG02000
ISN 0085      620 CONTINUE                                                              LCG02010
                C                                                                       LCG02020
                CC                                                                      LCG02030
                CC DETACH TAPE DRIVE                                                    LCG02040
                C                                                                       LCG02050
ISN 0086            WRITE(2,630)                                                        LCG02060
ISN 0087      630 FORMAT(' DETACH 181')                                                 LCG02070
                C                                                                       LCG02080
                CC                                                                      LCG02090
                CC WRITE NO. OF ACQ. SUN ELEVATION AND SATELITE NUMBER TO PROGRAM INPUT LCG02100
                CC FILE.                                                                LCG02110
                C                                                                       LCG02120
ISN 0088            WRITE(7,635)LSEGNO                                                  LCG02130
ISN 0089      635   FORMAT(I4)                                                        LCG02140
ISN 0090            WRITE(7,640)NUMACQ                                                  LCG02150
ISN 0091      640   FORMAT(I4)                                                        LCG02160
ISN 0092            WRITE(7,650)(LSEGAQ(I),I = 1,NUMACQ)                                LCG02170
ISN 0093      650   FORMAT(8I7)                                                       LCG02180
ISN 0094            WRITE(7,700)(LACQRQ(3,I),I = 1,NUMACQ)                              LCG02190
ISN 0095            WRITE(7,700)(LACQRQ(4,I),I = 1,NUMACQ)                              LCG02200
ISN 0096      700   FORMAT(10I4)                                                      LCG02210
                C                                                                       LCG02220
                CC                                                                      LCG02230
                CC FOR DOCUMENTARY PURPOSES WRITE SEGMENT NUMBER AND ACQUISITION        LCG02240
                CC NUMBER REQUESTED BY USER.                                            LCG02250
                C                                                                       LCG02260
ISN 0097            WRITE(20,750)                                                       LCG02270
ISN 0098      750   FORMAT(' PROGRAM INPUTS:')                                        LCG02280
ISN 0099            WRITE(20,800)LSEGNO                                                 LCG02290
```

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*LEVEL 2.3.0 (JUNE 78)          MAIN          OS/360  FORTRAN H EXTENDED          DATE 81.141/13.54.09      PAGE   4

   ISN 0100        800 FORMAT(' SEGMENT NUMBER:',I5)                                    LCG02300
   ISN 0101            WRITE(20,810)(LSEGAQ(I),I = 1,NUMACQ)                            LCG02310
   ISN 0102        810 FORMAT(' ACQUISITIONS:',8I10)                                    LCG02320
   ISN 0103            WRITE(20,820)(LACQRQ(3,I),I = 1,NUMACQ)                          LCG02330
   ISN 0104        820 FORMAT(' SUN ANGLES',10I4)                                       LCG02340
   ISN 0105            WRITE(20,830)(LACQRQ(4,I),I = 1,NUMACQ)                          LCG02350
   ISN 0106        830 FORMAT(' LANDSAT NUMBER',10I4)                                   LCG02360
   ISN 0107        900 STOP                                                             LCG02370
   ISN 0108            END                                                              LCG02380


                        *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL   INTERNAL STATEMENT NUMBERS
I        0021  0022  0044  0045  0046  0057  0058  0060  0064  0071  0074  0078  0079  0079  0081  0082  0083  0092  0092
         0092  0094  0094  0095  0095  0095  0101  0101  0103  0103  0103  0105  0105  0105
J        0027  0028  0043  0046  0049  0050  0051  0052  0053
K        0026  0028  0032
O        0068
IERR     000A  0034  0035  0035  0037
ITEM     0045  0049  0050  0051  0052  0053  0053
INDEX    0002  0034  0046  0049  0050  0051  0052  0053  0053
INTAG    0011  0055  0058  0060  0064  0071  0074  0078  0079  0079  0082  0083
IUNIT    0014  0082  0083
LACQRQ   0009  0049  0050  0051  0052  0053  0055  0058  0060  0064  0078  0079  0079  0094  0095  0103  0105
LSEGAQ   0007  0022  0028  0032  0046  0092  0101
LSEGNO   0003  0019  0034  0071  0074  0083  0088  0099
LSEGTP   0005  0028  0032  0034
LSTAPE   0012  0056  0058  0078
NACQRQ   0004  0010  0025  0031  0031  0032  0034  0044
NFLSKP   0013  0064  0065  0065  0068  0071  0079
NUMACQ   0006  0017  0021  0026  0027  0043  0055  0057  0081  0090  0092  0094  0095  0101  0103  0105
RTEERR   0037
SFGALL   0034
TSRTHS   0055


                        *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
 LABEL   DEFINED   REFERENCES
    90     0016    0015
   100     0018    0017
   105     0023    0021
   110     0020    0019
   120     0024    0022
   130     0030    0027
   140     0033    0026  0028
   250     0039    0038
   300     0041    0035
   310     0042    0041
   370     0048    0044
   400     0049    0046
   450     0054    0043
   500     0061    0060
   510     0063    0062
   520     0065    0058
   530     0067    0065
   540     0070    0068
   550     0073    0071
   560     0075    0074
   580     0077    0076
   600     0080    0057
   610     0084    0083
   620     0085    0081
   630     0087    0086
   635     0089    0088
   640     0091    0090
   650     0093    0092
   700     0096    0094  0095
   750     009A    0097
   800     0100    0099
   810     0102    0101
   820     0104    0103
   830     0106    0105
   900     0107    0040

                                        /    MAIN /    SIZE OF PROGRAM 009854 HEXADECIMAL BYTES

      NAME    TAG   TYPE  ADD.        NAME    TAG   TYPE  ADD.        NAME    TAG   TYPE  ADD.        NAME    TAG   TYPE  ADD.
```

```
      I SF    |*4  000344      J SF    |*4  000348      K SF    |*4  00034C      O       R*4  000350
   IERR SFA   |*4  000354   ITEM SF    |*4  000358   INDEX SFA  |*4  000664   INTAG SFA  |*4  000374
  IUNIT SF    |*4  000360 IBCOM# F  XF  |*4  000000  LACORG SFA  |*4  00039C  LSEGAG SF   |*4  000464
 LSEGNO SFA   |*4  000368 LSEGTP SFA    |*4  000564  LSTAPE S    |*4  000364  NACORG SFA  |*4  000368
 NFLSKP SF    |*4  000360 NUMACO SFA    |*4  000370  RTEERR SF XF|    000000  SEGALL SF XF|    000000
 TSRTHS SF XF      000000
```

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
105	23	0092FA	130	30	009334	140	33	009360	300	41	009388
370	48	0093F0	400	49	0093FC	450	54	00947C	520	65	009512
600	80	009624	620	85	00967A	900	107	009824			

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100000	1	009280	100001	22	0092D8	100002	24	009306	100003	27	009316
100004	28	00931A	100005	31	009340	100006	34	009374	200001	36	009388
100007	37	009394	100008	44	0093D0	100009	45	0093D4	100011	55	009488
100012	58	00949E	100013	60	009488	100014	66	00951C	100015	68	009538
100016	69	009554	100017	71	009568	100018	72	009572	100019	74	00959E
100020	81	009630	100021	82	009634	100022	86	009686	200002	103	0097C4

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
90	16	000028	100	18	000039	110	20	000030	120	24	000041
250	39	000045	310	42	000058	500	61	000068	510	63	000087
530	67	000099	540	70	0000A9	550	73	0000DA	560	75	000125
580	77	000171	610	84	00017E	630	87	0001CD	635	89	0001DC
640	91	0001E0	650	93	0001E4	700	96	0001EA	750	98	0001F0
800	100	000204	810	102	00021A	820	104	000230	830	106	000243

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 107, PROGRAM SIZE = 38996, SURPROGRAM NAME = MAIN

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 276K BYTES OF CORE NOT USED

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*LEVEL 2.3.0 (JUNE 78)                OS/360  FORTRAN H EXTENDED          DATE 81.113/16.58.46       PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002             SUBROUTINE TSRTHS(                                                          TSR00010
                C                                 TAGSORT USING HIBBARD'S SHELL SORT              TSP00020
                     O INTAG,                                                                     TSR00030
                C                                 INTGER ARRAY OF TAGS (POINTERS) SORTED BY       TSR00040
                C                                 INTEGER KEY                                     TSR00050
                     =                                                                            TSR00060
                     I KRECRD,                                                                    TSR00070
                C                                 ARRAY OF INTEGER RECORDS TO SORT                TSP00080
                     ( NWIREC,                                                                    TSP00090
                C                                 NUMBER OF WORDS IN ONE RECORD                   TSP00100
                     ( NRECS,                                                                     TSP00110
                C                                 NUMBER OF RECORDS (ALSO NUMBER OF TAGS)         TSP00120
                     I KEYLOC,                                                                    TSP00130
                C                                 LOCATION WITHIN RECORD OF SORT KEY              TSP00140
                     I KSORDR)                                                                    TSR00150
                C                                 KEY SORT ORDER 'A' FOR ACENDING, 'D' FOR        TSP00160
                C                                 DECENDING                                       TSP00170
                C    ------------------------------------------------------------                 TSP00180
                C                                                                                 TSP00190
                C                                                                                 TSP00200
                C    HISTORY                                                                      TSP00210
                C    ------                                                                       TSP00220
                C                                                                                 TSP00230
                C        M A TOMPKINS      LEMSCO  01/27/81       ORIGINAL CODE                  TSP00240
                C                                                                                 TSP00250
                C                                                                                 TSP00260
                C    METHOD                                                                       TSP00270
                C    ------                                                                       TSP00280
                C                                                                                 TSP00290
                C        CHECK FOR VALID ARGUMENTS.                                               TSP00300
                C        SORT TAGS IN SPECIFIED KEY SEQUENCE USING HIBBARD'S IMPROVED              TSR00310
                C        SHELLSORT (CACM ALGORITHM # 201)                                         TSP00320
                C                                                                                 TSP00330
                C                                                                                 TSP00340
                C    MACHINE DEPENDENT CODE                                                       TSP00350
                C    ----------------------                                                       TSP00360
                C                                                                                 TSP00370
                C        NONE                                                                     TSP00380
                C                                                                                 TSP00390
                C                                                                                 TSP00400
                C    EXTERNAL REFERENCES                                                          TSP00410
                C    -------------------                                                          TSP00420
                C                                                                                 TSP00430
                C        INTEGER IVALUE        ALLOWS THE USE OF LITERALS                         TSP00440
                C                                                                                 TSP00450
                C                                                                                 TSP00460
                C    EXCEPTIONS                                                                   TSP00470
                C    ----------                                                                   TSP00480
                C                                                                                 TSP00490
                C        THE FOLLOWING INVALID ARGUMENT VALUES PREVENT SORTING AND CAUSE          TSP00500
                C        INTAG(1) TO BE SET TO 0:                                                 TSP00510
                C           NWIREC < 1                                                            TSP00520
                C           NRECS < 1                                                             TSP00530
                C           SORT KEY WHOLLY OR PARTIALLY OUTSIDE RECORD                           TSP00540
                C           KSORDR NOT 'A' OR 'D'                                                 TSP00550
                C                                                                                 TSP00560
                C                                                                                 TSP00570
                C    LOCAL DECLARATIONS                                                           TSP00580
                C    ------------------                                                           TSP00590
                C                                                                                 TSP00600
   ISN 0003             INTEGER INTAG(1)                                                         TSP00610
                C                                 INTEGER ARGUMENT                                TSP00620
   ISN 0004             INTEGER KRECRD(NWIREC,NRECS)                                             TSP00630
                C                                 ARRAY ARGUMENT                                  TSP00640
   ISN 0005             INTEGER KDIST                                                            TSP00650
                C                                 COMPARISON DISTANCE                             TSP00660
   ISN 0006             INTEGER KRN                                                              TSP00670
                C                                 PRIMARY COMPARISON RECORD NUMBER                TSP00680
   ISN 0007             INTEGER KRNDIS                                                           TSP00690
                C                                 DISTANT COMPARISON RECORD NUMBER                TSP00700
   ISN 0008             INTEGER KTN                                                              TSP00710
                C                                 TAG NUMBER OF PRIMARY COMPARISON RECORD         TSP00720
   ISN 0009             INTEGER KTMAX                                                            TSR00730
```

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                C                                                                    TSR00740
                C     MAXIMUN TAG NUMBER OF PCP                                      TSR00750
   ISN 0010           INTEGER KTNHI                                                  TSR00760
                C     CURRENT HIGHEST TAG NUMBER OF PCR                              TSR00770
                C                                                                    TSR00780
                C                                                                    TSR00790
                C PROCEDURE                                                          TSR00800
                C ---------                                                          TSR00810
                C                                                                    TSR00820
                C                                                                    TSR00830
                C CHECK ARGUMENTS. SET FLAG FOR BAD ARGUMENT(S).                     TSR00840
                C                                                                    TSR00850
   ISN 0011           INTAG(1) = 0                                                   TSR00860
                C                                                                    TSR00870
   ISN 0012           IF(KSORDR.NE.IVALUE('A').AND.KSORDR.NE.IVALUE('D')) GO TO 900  TSR00880
                C                                                                    TSR00890
   ISN 0014           IF(NW1REC.LT.1) GO TO 900                                      TSR00900
   ISN 0016           IF(NRECS.LT.1) GO TO 900                                       TSR00910
                C                                                                    TSR00920
   ISN 0018           IF(KEYLOC.LT.1) GO TO 900                                      TSR00930
   ISN 0020           IF(KEYLOC.GT.NW1REC) GO TO 900                                 TSR00940
                C                                                                    TSR00950
                C INITIALIZE TAGS                                                    TSR00960
                C                                                                    TSR00970
   ISN 0022           DO 160 KRN = 1,NRECS                                           TSR00980
   ISN 0023              INTAG(KRN) = KRN                                            TSR00990
   ISN 0024        160 CONTINUE                                                     TSR01000
                C                                                                    TSR01010
                C PERFORM SORT                                                       TSR01020
                C                                                                    TSR01030
   ISN 0025           KDIST = NRECS                                                  TSR01040
                C                                                                    TSR01050
                C WHILE KDIST <> 1 DO                                                TSR01060
                C                                                                    TSR01070
   ISN 0026        200 IF(KDIST.EQ.1) GO TO 900                                     TSR01080
   ISN 0028           KDIST = 2*((KDIST + 2)/4) - 1                                 TSR01090
   ISN 0029           KTNMAX = NRECS - KDIST                                        TSR01100
   ISN 0030           DO 400 KTNHI = 1,KTNMAX                                       TSR01110
   ISN 0031              KTN = KTNHI                                                TSR01120
   ISN 0032        250    IF(KTN.LT.1) GO TO 300                                    TSR01130
   ISN 0034              KRN = INTAG(KTN)                                           TSR01140
   ISN 0035              KRNDIS = INTAG(KTN + KDIST)                                TSR01150
   ISN 0036              IF((KSORDR.EQ.IVALUE('A')).AND.                            TSR01160
                  &         (KRECRD(KEYLOC,KRN).LE.KRECRD(KEYLOC,KRNDIS))) GO TO 400 TSR01170
   ISN 0038              IF((KSORDR.EQ.IVALUE('D')).AND.                            TSR01180
                  &         (KRECRD(KEYLOC,KRN).GE.KRECRD(KEYLOC,KRNDIS))) GO TO 400 TSR01190
   ISN 0040              INTAG(KTN) = KRNDIS                                        TSR01200
   ISN 0041              INTAG(KTN + KDIST) = KRN                                   TSR01210
   ISN 0042              KTN = KTN - KDIST                                          TSR01220
   ISN 0043           GO TO 250                                                     TSR01230
   ISN 0044        300    CONTINUE                                                  TSR01240
   ISN 0045        400 CONTINUE                                                     TSR01250
   ISN 0046           GO TO 200                                                     TSR01260
                C                                                                    TSR01270
                C                                                                    TSR01280
                C                                                                    TSR01290
   ISN 0047        900 RETURN                                                       TSR01300
   ISN 0048           END                                                           TSR01310
                                                                                     TSR01320
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT NUMBERS							
KRN	0004	0022	0023	0023	0034	0036	0038	0041	
KTN	0008	0031	0032	0034	0035	0040	0041	0042	0042
INTAG	0002	0003	0011	0023	0034	0035	0040	0041	
KDIST	0005	0025	0026	0028	0028	0029	0035	0041	0042
KTNMAX	0009								
KTNHI	0010	0030	0031						
NRECS	0002	0004	0016	0022	0025	0029			
IVALUE	0012	0012	0036	0038					
KEYLOC	0002	0018	0020	0036	0036	0038	0038		
KRECRD	0002	0004	0036	0036	0038	0038			
KRNDIS	0007	0035	0036	0038	0040				
KSORDR	0002	0012	0012	0036	0038				
KTNMAX	0009	0030							
NW1REC	0002	0004	0014	0020					
TSRTHS	0002								

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES					
160	0024	0022					
200	0026	0046					
250	0032	0043					
300	0044	0032					
400	0045	0030	0036	0038			
900	0047	0012	0014	0016	0018	0020	0026

/ TSRTHS / SIZE OF PROGRAM 00035C HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
KRN	SF	I*4	0000C0	KTN	SF	I*4	0000C4	INTAG	SF XR	I*4	000000	KDIST	SF	I*4	0000C8
KTMAX		I*4	NR	KTNMI	SF	I*4	0000CC	NRECS	F	I*4	0000D0	IVALUE	XF	I*4	000000
KEYLOC		I*4	0000D4	KRECRD	XP	I*4	000000	KWNDIS	SF	I*4	0000D8	KSORDR		I*4	00000C
KTNMAX	SF	I*4	0000E0	NWIREC		I*4	0000E4	TSRTHS		P*4	0000E9				

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
160	24	000174	200	26	000182	250	32	0001H8	300	44	0002CA
400	45	0002CA	900	47	0002E0						

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000104	200001	13	00012E	100002	14	000140	100003	16	000148
100004	18	000150	100005	20	000158	100006	22	000164	100007	23	000166
100008	25	00017E	100009	28	000188	100010	31	0001R0	100011	34	0001C0
100012	38	000240	100013	40	00029E	100014	46	0002DC			

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 47, PROGRAM SIZE = 860, SUBPROGRAM NAME =TSRTHS

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 296K BYTES OF CORE NOT USED

APPENDIX D

```
*LEVEL 2.3.0 (APR  78)                    OS/360  FORTRAN H EXTENDED          DATE 81.139/13.16.48       PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EXTDIC NOLIST NODECK OBJECT MAP NOREORDER NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

                C                                                                                        CLA00010
                C  PROGRAMMER--------------------MAUK&AR 8/5/80                                        CLA00020
                C  CONVERTED TO IBM 3033---------C. HORTON, LOCKHEED, 2/20/81                          CLA00030
                C                                                                                        CLA00040
                C  THIS PROGRAM USING THE CROP DEVELOPMENT PROFILE IN                                    CLA00050
                C  GREENESS AND LOOKS AT THE COEFFICIENTS ALPHA, BETA & TO.                              CLA00060
                C                                                                                        CLA00070
                C  DOCUMENTATION CONVENTIONS:                                                            CLA00080
                C      (VARIABLE)  VARIABLE NAME                                                         CLA00090
                C      -ROUTINE-   SUBPROGRAM NAME                                                       CLA00100
                C      /BLOCK/     COMMON BLOCK NAME                                                     CLA00110
                C                                                                                        CLA00120
                C  PROGRAM CONTAINS 4 SECTIONS                                                           CLA00130
                C    SECTION 1--READS DATE, USER DEFINED DATA, CALCULATES DATES                          CLA00140
                C      AS DAYS OF YEAR, CALCULATES SINES OF SUN ANGLES,                                  CLA00150
                C      FINDS POSSIBLE DUPLICATED ACQUISITION DATE (NREP)                                 CLA00160
                C      AND PRINTS REPORT HEADER                                                          CLA00170
                C                                                                                        CLA00180
                C    SECTION 2--READS FILE HEADER & TRAINING FLD COORDINATES -RDFLES-,                   CLA00190
                C      READS TRAINING FLD, SELECTS PIXELS FROM TRAINING FLD,                             CLA00200
                C      PRINTS TRAINING FIELD COORDINATES ON REPORT,                                      CLA00210
                C      CALLS -SDEV- TO CALCULATE MEAN (XMEAN) AND ST. DEV. (SGMATR)                      CLA00220
                C      FOR PIXELS IN TRAINING FLD AND CALLS -TRJXM- TO CALCULATE                         CLA00230
                C      A (TRAINA), ALPHA (TRALPH), BETA (TRBETA) AND TO (TRTO)                           CLA00240
                C      FOR PIXELS IN THE TRAINING FIELD                                                  CLA00250
                C                                                                                        CLA00260
                C    SECTION 3--CREATES AND WRITES HEADER                                                CLA00270
                C                                                                                        CLA00280
                C    SECTION 4---REREADS FILE HEADER AND READS TEST FLD COORDINATES,                     CLA00290
                C      READS AND PROCESSES TEST FLD USING CONSTANTS CALCULATED                           CLA00300
                C      IN SECTION 2 (XMNTRN, SGMATR, TRAINA, TRALPH, TRBETA, TRTO) AND                   CLA00310
                C      CALLS -TRJXM- TO CALCULATE ALPHA (IALPHF), BETA (IBETAF),                         CLA00320
                C      TO (ITOBUF) AND SIGMA (ICMIHF) FOR EACH PIXEL IN THE TEST FL                      CLA00330
                C      WRITES COEFFICIENTS CALCULATED TO FILE 8                                          CLA00340
                C                                                                                        CLA00350
                C  ATTACHMENT A:  FILE CLASFYG CONSTANT--FILE OF VARIABLES & DESCRIPTIONS                CLA00360
                C                                                                                        CLA00370
                C                                                                                        CLA00380
                C                                                                                        CLA00390
                C  ***************************************************************************          CLA00400
                C  ***************************************************************************          CLA00410
                C                                                                                        CLA00420
ISN 0002        C      IMPLICIT INTEGER*4 (C-H)                                                          CLA00430
                C                                                                                        CLA00440
                C  IDATA HAS (72 * 4*196) CHARACTERS FOR A MAX OF 8 ACQUISITIONS                         CLA00450
ISN 0003        C      COMMON /LINES/ NXTLNF, LINENO, IDATA(456,8), NDACQS                               CLA00460
ISN 0004        C      LOGICAL*1 IDATA(HOLD)(4)                                                          CLA00470
ISN 0005        C      EQUIVALENCE (IHOLD)(1),IHOLD4)                                                    CLA00480
                C                                                                                        CLA00490
ISN 0006        C      COMMON /MISC/NDACQ, ACQDT(4), KSEGM,DATE(4),LANDST(8)                             CLA00500
ISN 0007        C      REAL*8 ACQDT                                                                      CLA00510
ISN 0008        C      LOGICAL*1 ACQDTH(8,4)                                                             CLA00520
ISN 0009        C      EQUIVALENCE (ACQDT(1),ACQDTH(1,1))                                                CLA00530
                C                                                                                        CLA00540
ISN 0010        C      COMMON /USER/ ICROP(4), IX(4), SANGG(8)                                           CLA00550
ISN 0011        C      INTEGER*4 SANGG                                                                   CLA00560
ISN 0012        C      DIMENSION SANG(4)                                                                 CLA00570
                C                                                                                        CLA00580
ISN 0013        C      REAL*8 WEIGHT(8), TODAY                                                           CLA00590
ISN 0014        C      INTEGER*2 STIME(2), NTIME(2)                                                      CLA00600
ISN 0015        C      DIMENSION ICHAN2(196,4,8)                                                         CLA00610
ISN 0016        C      REAL*4 CLMDST(2,4)                                                                CLA00620
ISN 0017        C      DIMENSION XDAY(4)                                                                 CLA00630
ISN 0018        C      DIMENSION BETA(8)                                                                 CLA00640
ISN 0019        C      DIMENSION VERTPX(4),VERTLN(4),XGWEEN(4,10)                                        CLA00650
ISN 0020        C      DIMENSION YGREEN(10),SGMATR(8),IDATE(4)                                           CLA00660
ISN 0021        C      DIMENSION SIGMA(4), PHI A(4), XMNTRN(4), XPIXGR(10)                               CLA00670
ISN 0022        C      INTEGER*4 IALPHF(196), IBETAF(196), ITOBUF(196), ICMIHF(196)                      CLA00680
                C                                                                                        CLA00690
ISN 0023        C      LOGICAL*1 IBUF(3360), NSEG(4), IDAY, IMON, IYEAR                                  CLA00700
ISN 0024        C      EQUIVALENCE (NSEG(1),JSEG)                                                        CLA00710
                                                                                                         CLA00720
                                                                                                         CLA00730
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ISN 0025            LOG(CAL*) KA,KB,KC,KD,KE,KF,KG,KH,KI,KJ,KK,KL,KM,KN,KO,KP,KR,KS                CLA00740
ISN 0026            LOG(CAL*) KT,KU,KV                                                             CLA00750
ISN 0027            LOG(CAL*) KFORMAL, KBLANK                                                      CLA00760
                    C                                                                              CLA00770
ISN 0028            DATA KA/'A'/,KB/'B'/,KC/'C'/,KD/'D'/,KE/'E'/,KF/'F'/,KG/'G'/                   CLA00780
ISN 0029            DATA KH/'H'/,KI/'I'/,KJ/'J'/,KK/'K'/,KL/'L'/,KM/'M'/,KN/'N'/                   CLA00790
ISN 0030            DATA KO/'O'/,KP/'P'/,KQ/'Q'/,KS/'S'/,KT/'T'/,KU/'U'/                           CLA00800
ISN 0031            DATA  THOLD4/8/, KBLANK/' '/                                                   CLA00810
                    C                                                                              CLA00820
ISN 0032            DATA CLNDST(1,1)/1./,CLNDST(1,2)/1./,CLNDST(1,3)/1./                           CLA00830
ISN 0033            DATA CLNDST(1,4)/1./                                                           CLA00840
ISN 0034            DATA CLNDST(2,1)/1.161/, CLNDST(2,2)/1.230/, CLNDST(2,3)/1.246/                CLA00850
ISN 0035            DATA CLNDST(2,4)/1.062/                                                        CLA00860
                    C                                                                              CLA00870
ISN 0036            DATA XTOL/3.E-05/, MODE/1/                                                     CLA00880
ISN 0037            DATA LIMIT/8/                                                                  CLA00890
ISN 0038            DATA K1/8/,K2/16/,K106/78/,K150/104/,K200/128/,K304/196/                        CLA00900
                    C                                                                              CLA00910
                    C ***************************************************************************CLA00920
                    C ***************************************************************************CLA00930
                    C                                                                              CLA00940
                    C  SECTION 1--READS DATE, USER DEFINED DATA, CALCULATES DATES AS DAYS          CLA00950
                    C     OF YEAR, CALCULATES SINES OF SUN ANGLES,                                 CLA00960
                    C     FINDS POSSIBLE DUPLICATED ACQUISITION DATES (KREP) AND                   CLA00970
                    C     PRINTS HEADING AT TOP OF REPORT                                          CLA00980
                    C                                                                              CLA00990
                    C  READ DATE AND TIME                                                          CLA01000
ISN 0039            CALL CPTIME (TODAY, STIME, ICPTIM, IVCPTM)                                     CLA01010
                    C                                                                              CLA01020
                    C  CHANGE SYSTEM ERROR ROUTINE TO NO MESSAGE, NO ABORT, ONLY COUNT AT          CLA01030
                    C  END OF PROGRAM  FOR OVERFLOW, UNDERFLOW AND EXPONENT TOO LARGE              CLA01040
ISN 0040            CALL ERRSET (207, 300, -1, 1, 0, -1)                                           CLA01050
ISN 0041            CALL ERRSET (209, 300, -1, 1, 0, -1)                                           CLA01060
ISN 0042            CALL ERRSET (252, 300, -1, 1, 0, -1)                                           CLA01070
                    C                                                                              CLA01080
                    C  READ USER DEFINITION CARDS                                                  CLA01090
ISN 0043            CALL RDEFC                                                                     CLA01100
                    CCCC  WRITE (3,9999) NOACQ, KSEGM,(ACQDT(I),I=1,8),(SANGGG(I),I=1,8),          CLA01110
                    CCCC 1   (LANDST(I),I = 1,8)                                                   CLA01120
ISN 0044            9999  FORMAT (' NOACQ,KSEGM,ACQDT,SANG,LANDST=',/,I4,1X,A4,                   CLA01130
                          1  1X,4A7,/,1X,8I3,1X,8I2)                                              CLA01140
                    C                                                                              CLA01150
                    C  CALL CROPG SUBROUTINE                                                       CLA01160
ISN 0045            CALL CROPG(IERROR)                                                             CLA01170
                    C                                                                              CLA01180
                    C  IF ALL SUNANGLES ARE THE SAME, STOP PROGRAM                                 CLA01190
ISN 0046            DO 6 I = 2,NOACQ                                                               CLA01200
ISN 0047            IF (SANGGG(I) .NE. SANGGG(1) ) GO TO 8                                         CLA01210
ISN 0049          6 CONTINUE                                                                       CLA01220
                    C                                                                              CLA01230
                    C  ALL SUNANGLES ARE THE SAME, HALT EXECUTION                                  CLA01240
ISN 0050            WRITE (3,7)   (SANGGG(I),I=1,NOACQ)                                            CLA01250
ISN 0051            WRITE (6,7)   (SANGGG(I),I=1,NOACQ)                                            CLA01260
ISN 0052            WRITE (3,9)                                                                    CLA01270
ISN 0053            WRITE (6,9)                                                                    CLA01280
ISN 0054          7   FORMAT (' SUNANGLES FROM DATA BASE =',8I4)                                   CLA01290
ISN 0055          9   FORMAT (' USER SHOULD INPUT NEW SUNANGLES IN USERG FILE.')                   CLA01300
ISN 0056            STOP                                                                           CLA01310
                    C                                                                              CLA01320
ISN 0057          8   IF (IERROR .NE. 0) STOP                                                      CLA01330
                    CCCC  WRITE (3,9998) ICROP, IX                                                 CLA01340
ISN 0059            9998  FORMAT (' ICROP, IX=',2X,4A1, 4F8.2)                                    CLA01350
ISN 0060            NOACQS = NOACQ                                                                 CLA01360
                    C                                                                              CLA01370
                    C  CALCULATE SUN ANGLE VALUE FROM SUN ANGLE GIVEN                              CLA01380
ISN 0061            DO 3  I = 1,8                                                                  CLA01390
ISN 0062            SAG(I) = 1.0                                                                   CLA01400
ISN 0063            IF (SANGGG(I) .EQ. 0) GO TO 3                                                  CLA01410
ISN 0065            ANG = SANGGG(I) * 0.01745                                                      CLA01420
ISN 0066            IF (ANG .LE. 0.02) ANG = 20.0 * 0.01745                                        CLA01430
ISN 0068            SAG(I) = 0.76604 / SIN(ANG)                                                    CLA01440
ISN 0069          3   CONTINUE                                                                     CLA01450
                    CCCC  WRITE (3,9997) (SAG(I),I = 1,8)                                          CLA01460
ISN 0070            9997  FORMAT (' SUN ANGLE CORRECTION FACTOR = ',/,4F9.5)                       CLA01470
                    C                                                                              CLA01480
                    C  CONVERT ACQUISITION DATES FROM ALPHA CODE TO COMPUTATIONAL NUMBER            CLA01490
ISN 0071            READ(5) 10                                                                     CLA01500
ISN 0072            WRITE (30,17) (ACQDT(III),III = 1,NOACQ)                                       CLA01510
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ISN 0073          REWIND 30
ISN 0074          READ (30,18) ((DATE(I,II),II = 1,NOACQ))
ISN 0075       17   FORMAT (8A4)
ISN 0076       18   FORMAT (5(2X,I3,3X))
ISN 0077          DO 5 I = 1,4
ISN 0078          XD(Y(I) = IDATE(I)/100.
ISN 0079        5 CONTINUE
                C
                C   CHECK TO SEE IF THE DAYS ARE REPEATED
ISN 0080          KREP = 0
ISN 0081          DO 1 JM = 2,NOACQS
ISN 0082          IF(IDATE(JM).EQ.IDATE(JM-1))  KREP=JM
ISN 0084        1 CONTINUE
                C
                C
                C  PRINT HEADING ON PRINTER REPORT
ISN 0085          WRITE(6,6000) IODAY,STIME(1),STIME(2),KSEGM,ICROP
ISN 0086       6000 FORMAT(1H1,10X,'SUPPORTING RESEARCH MULTITEMPORAL '
                  *'CLASSIFICATION'//11X,'PROCESSING DATE - ',A8,' AT ',I2,':',I2//
                  *11X,'SEGMENT NUMBER - ',A4,5X,'CROP OF INTEREST - ',4A1)
                C
                C
                C  ************************************
                C  SECTION 2--READS FILE HEADER & TRAINING FLD COORDINATES.
                C     PRINTS TRAINING FLD COORDINATES.
                C     READS THE TRAINING FLD AND CALCULATES THE FOLLOWING VALUES
                C      XMNTPH--MEAN FROM SDEV OF PIXELS IN TRAINING FIELD
                C      SGMATR--ST. DEV. FROM SDEV OF PIXELS IN TRAINING FIELD
                C      A--CALCULATED A VALUE FROM -TRJXM- FOR TRAINING FIELD
                C      TRALPH--CALCULATED ALPHA VALUE FROM TRJXM FOR TRAINING FL
                C
ISN 0087       100  ITYPE = 1
ISN 0088          CALL RDFLES(ITYPE, IHEDNE, VERTPX, VERTLN, IERROR)
                CCCC  IF (IERROR .NE. 0) STOP
                C
ISN 0089          WRITE(6,6002) ((VERTLN(I),VERTPX(I)),I = 1,4)
ISN 0090       6002 FORMAT(1H0,10X,'TRAINING FIELD -  LINE NO.     SAMP. NO.'/
                  *4(30X,F5.1,7X,F5.1/))
                C
                C   DETERMINE THE MAX AND MIN LINE NO. AND PIXEL NO. OF TEST FLD
                C
ISN 0091          LMAX = 1
ISN 0092          LMIN = 196
ISN 0093          MINPXL = 196
                C  CHECK CORNERS OF USER SUPPLIED TRAINING FLD
ISN 0094          MAXPXL = 1
ISN 0095          DO 24 JM = 1,4
ISN 0096          LINENO = VERTLN(JM)
ISN 0097          IPIXEL = VERTPX(JM)
ISN 0098          IF(LINENO.GE.LMAX) LMAX = LINENO
ISN 0100          IF(LINENO.LE.LMIN) LMIN = LINENO
ISN 0102          IF(IPIXEL.GE.MAXPXL) MAXPXL = IPIXEL
ISN 0104          IF(IPIXEL.LT.MINPXL) MINPXL = IPIXEL
                C
ISN 0106       24 CONTINUE
                C
                C
                C   **********  NORMAL PROCESSING OF TEST FIELD  **********
                C
                C  SET NUMBER OF PIXELS SELECTED TO 0
ISN 0107          NOTYPX = 0
                C
                C  ****************  PROCESS INDIVIDUAL LINES  ****************
                C
ISN 0108          DO 78 KOPLNE = LMIN, LMAX
ISN 0109          LINENO = KOPLNE
                C
                C   READ DATA FOR ONE LINE OF PIXELS
ISN 0110          ITYPE = 2
ISN 0111          CALL RDFLES (ITYPE, IDATA, VERTPX, VERTLN, IERROR)
                CCCC  IF (IERROR .NE. 0) STOP
                C
                C  MOVE PIXEL RADIANCE VALUES FROM THE 5 TO 4 RADIANCE FILES
                C    NUMBER OF FILES DEPENDS ON NUMBER OF ACQUISITIONS
ISN 0112          DO 50 KORACQ = 1,NOACQ
ISN 0113          DO 49 KORCHN = 1,4
ISN 0114          INCRF = (KORCHN - 1) * 196
                C
```

CLA01520 CLA01530 CLA01540 CLA01550 CLA01560 CLA01570 CLA01580 CLA01590 CLA01600 CLA01610 CLA01620 CLA01630 CLA01640 CLA01650 CLA01660 CLA01670 CLA01680 CLA01690 CLA01700 CLA01710 CLA01720 CLA01730 CLA01740 CLA01750 CLA01760 CLA01770 CLA01780 CLA01790 CLA01800 CLA01810 CLA01820 CLA01830 CLA01840 CLA01850 CLA01860 CLA01870 CLA01880 CLA01890 CLA01900 CLA01910 CLA01920 CLA01930 CLA01940 CLA01950 CLA01960 CLA01970 CLA01980 CLA01990 CLA02000 CLA02010 CLA02020 CLA02030 CLA02040 CLA02050 CLA02060 CLA02070 CLA02080 CLA02090 CLA02100 CLA02110 CLA02120 CLA02130 CLA02140 CLA02150 CLA02160 CLA02170 CLA02180 CLA02190 CLA02200 CLA02210 CLA02220 CLA02230 CLA02240 CLA02250 CLA02260 CLA02270 CLA02280 CLA02290

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ISN 0115          DO 49 KURPXL = MINPXL, MAXPXL                                  CLA02300
                C SKIP OVER FIRST 72 CHARACTERS OF LEAD DATA ON TAPE RECORD      CLA02310
ISN 0116          LOC = INCRE + KURPXL + 72                                      CLA02320
ISN 0117          IHOLD(4) = IDATA(LOC+KURACQ)                                   CLA02330
ISN 0118          ICHNPX(KURPXL,KURCHN,KURACQ) = IHOLD4                          CLA02340
ISN 0119     49   CONTINUE                                                       CLA02350
ISN 0120     50   CONTINUE                                                       CLA02360
                C                                                               CLA02370
                C                                                               CLA02380
                C ******  PROCESS INDIVIDUAL PIXELS IN THE CURRENT LINE  ******  CLA02390
ISN 0121          DO 77 KURPXL = MINPXL, MAXPXL                                  CLA02400
ISN 0122          IPIXEL = KURPXL                                                CLA02410
                C                                                               CLA02420
                C  CHECK IF LINE NO. AND PIXEL NO. LIE WITHIN THE TRAINING FIELD CLA02430
ISN 0123          XLINE = LINENO                                                 CLA02440
ISN 0124          XPIXEL = IPIXEL                                                CLA02450
ISN 0125          CALL RECT (XLINE,XPIXEL,VERTLN,VERTPX,ICOR)                    CLA02460
ISN 0126          IF(ICOR.EQ.1) GO TO 77                                         CLA02470
                C                                                               CLA02480
                C PIXEL IN TRAINING FIELD                                       CLA02490
                C                                                               CLA02500
                C SKIP OVER SCREENED PIXELS                                     CLA02510
ISN 0128          DO 24 J = 1,NOACQS                                             CLA02520
ISN 0129          IF (ICHNPX(IPIXEL,4,J) .GT. 127) GO TO 77                      CLA02530
ISN 0131     24   CONTINUE                                                       CLA02540
                C                                                               CLA02550
                C INCRE COUNT OF SELECTED PIXELS (IN USER TRAINING FLD, NOT SCREENED) CLA02560
ISN 0132          NOTRPX=NOTRPX+1                                                CLA02570
                C                                                               CLA02580
                CCCC  WRITE (6,9996) LINENO, IPIXEL                             CLA02590
ISN 0133        9996  FORMAT (' LINENO=',I4,'  PIXEL=',I4)                      CLA02600
                C   COMPUTE THE GREENESS VALUES AND STORE IN XGREEN FOR TRAINING FLD PIXCLA02610
                C                                                               CLA02620
ISN 0134          DO 27 J = 1,NOACQS                                             CLA02630
ISN 0135          INDEX = LANDST(J) - 1                                          CLA02640
ISN 0136          XGREEN(J,NOTRPX) = (-.29 * ICHNPX(IPIXEL,1,J) * CLNDST(INDEX,1) - CLA02650
                 1              .562 * ICHNPX(IPIXEL,2,J) * CLNDST(INDEX,2) +  CLA02660
                 2              .6 * ICHNPX(IPIXEL,3,J) * CLNDST(INDEX,3) +    CLA02670
                 3  .2455*2.0*ICHNPX(IPIXEL,4,J) * CLNDST(INDEX,4) ) * SANG(J) + 10.CLA02680
                CCCC  WRITE (6,9995) J, (ICHNPX(IPIXEL,I,J),I = 1,4),XGREEN(J,NOTRPX) CLA02690
ISN 0137        9995  FORMAT (' ACQ',I1,' VALUES=',4I6,' GREEN=',F12.6)         CLA02700
ISN 0138     27   CONTINUE                                                       CLA02710
                C                                                               CLA02720
                C END OF TRAINING PIXEL COLLECTION WHEN 10 PIXELS COLLECTED     CLA02730
ISN 0139          IF (NOTRPX .EQ. 10) GO TO 28                                   CLA02740
                C                                                               CLA02750
                C END OF PIXEL DO LOOP                                          CLA02760
ISN 0141     77   CONTINUE                                                       CLA02770
                C                                                               CLA02780
                C                                                               CLA02790
                C END OF LINE DO LOOP                                           CLA02800
ISN 0142     78   CONTINUE                                                       CLA02810
                C                                                               CLA02820
                C                                                               CLA02830
                C                                                               CLA02840
                C GO TO PROCESS TEST FLD IF AT LEAST 2 ACCEPTABLE PIXEL IN TRAINING FLDCLA02850
ISN 0143     28   IF(NOTRPX.GT.1) GO TO 48                                       CLA02860
                C                                                               CLA02870
                C  STOP PROCESSING IF LESS THAN 2 ACCEPTABLE PIXELS IN TRAINING FLD CLA02880
ISN 0145          WRITE(6,950) NOTRPX                                            CLA02890
ISN 0146     950    FORMAT(1H0,'PROGRAM TERMINATED BECAUSE THERE WERE LESS'/     CLA02900
                *' THAN TWO PIXELS IN THE TEST FIELD.  NOTRPX = ',I1//)         CLA02910
ISN 0147          WRITE (6,9001)                                                 CLA02920
ISN 0148    9001  FORMAT (' NOT ENOUGH PIXELS IN TEXT FIELD')                    CLA02930
ISN 0149          STOP                                                           CLA02940
                C                                                               CLA02950
                C                                                               CLA02960
                C                                                               CLA02970
                C *****  ACCEPTABLE SET OF TRAINING PIXELS HAS BEEN COLLECTED  ***** CLA02980
                C                                                               CLA02990
                C COMPUTE MEAN AND STANDARD DEVIATION                           CLA03000
                C                                                               CLA03010
ISN 0150     48   DO 29 K = 1,NOACQS                                             CLA03020
ISN 0151          DO 31 I = 1,NOTRPX                                             CLA03030
ISN 0152          YGREEN(I) = XGREEN(K,I)                                        CLA03040
ISN 0153     31   CONTINUE                                                       CLA03050
                C                                                               CLA03060
ISN 0154          CALL SDEV (YGREEN, NOTRPX, XMEAN, SIGMA)                       CLA03070
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ISN 0155            XMNTRN(M) = XMEAN                                          CLA03040
ISN 0156            SGMATR(M) = SIGMAG                                         CLA03090
ISN 0157            IF(M.EQ.XMEP) SGMATR(M) = 20.*SGMATR(M)                    CLA03100
ISN 0159         24 CONTINUE                                                   CLA03110
                 C                                                             CLA03120
                 C  PRINT MEAN AND STD. DEV. FOR TRAINING FIELD.               CLA03130
                 C                                                             CLA03140
ISN 0160            WRITE (6,6003) NOTRPX, (ACQDT(I),I = 1,NOACQ)              CLA03150
ISN 0161         6003 FORMAT(1H ,10X,'MEANS AND STD. DEV. FOR TRAINING FIELD',  CLA03160
                    *' BASED ON ',I2,' PIXELS -'//15X,'GREENESS',16X,           CLA03170
                    *'----------ACQUISITION DATES----------'/15X,'NUMBER',17X,  CLA03180
                    *  8(A5,3X))                                               CLA03190
                 C                                                             CLA03200
ISN 0162            I = 1                                                      CLA03210
ISN 0163            WRITE(6,6004) I,XMNTRN,SGMATR                              CLA03220
ISN 0164         6004 FORMAT(1H0,18X,I1,6X,'MEAN',5X,8F8.2/26X,'STD. DEV.',8F8.2) CLA03230
ISN 0165            WRITE(6,6005)                                              CLA03240
ISN 0166         6005 FORMAT(1H0,10X,'CONSTANTS FOR MODEL -'//16X,'CHANNEL'/    CLA03250
                    *16X,'NUMBER',16X,'A',12X,'ALPHA',11X,'BETA',11X,'TO',12X,'CHISQ') CLA03260
                 C                                                             CLA03270
ISN 0167            WRITE(6,6006) I,ZX                                         CLA03280
ISN 0168         6006 FORMAT(1H0,18X,I1,6X,'INITIAL',1X,4(F8.2,7X))            CLA03290
                 C                                                             CLA03300
                 C  COMPUTE GREENESS FIT FOR TRAINING FIELD                    CLA03310
ISN 0169            XLAMDA = 1.E-03                                            CLA03320
ISN 0170            XCHIQ = 200.                                               CLA03330
ISN 0171            NMODE = 0                                                  CLA03340
ISN 0172            NTERM=4                                                    CLA03350
                 C                                                             CLA03360
                 C  CALCULATE WEIGHT FACTOR                                    CLA03370
ISN 0173            DO 2999 I = 1,NOACQS                                       CLA03380
ISN 0174         2999 WEIGHT(I) = 1. / (SGMATR(I) * SGMATR(I) )                CLA03390
CCCC                WRITE (3,9994) WEIGHT, XDAY, SANGGG,SANG                   CLA03400
ISN 0175         9994 FORMAT (' WEIGHT=',8F7.2,/,'  DOY=',8F6.1,/,' SANGGG=',8I5,/, CLA03410
                    1  '  SANG=',8F7.2)                                       CLA03420
                 C                                                             CLA03430
                 C  FIT MODEL TO THE SELECTED TRAINING FLD PIXELS.  ITERATE UNTIL AN CLA03440
                 C  ACCEPTABLE FIT OBTAINED OR A MAXIMUM OF 24 ITERATIONS      CLA03450
ISN 0176            DO 3001 IA = 1,24                                          CLA03460
                 C                                                             CLA03470
                 C  IPRINT USED IN DEBUG TO TRACK VALUE OF A(1). -1=PRINT      CLA03480
ISN 0177            IPRINT = -1                                                CLA03490
                 C                                                             CLA03500
ISN 0178            CALL TRJXM(XDAY,XMNTRN,SGMATR,NOACQS,NTERM,MODE,ZX,PELTA,SIGMA, CLA03510
                    1 XLAMDA,OFIX,XISQR,NMODE, WEIGHT, IPRINT)                 CLA03520
ISN 0179            XDIF = XCHIN-XISQR                                         CLA03530
ISN 0180            XTH = XISQR*XTOL                                           CLA03540
ISN 0181            IF(ABS(XDIF).LE.XTH) GO TO 3002                            CLA03550
ISN 0183            XCHIN = XISQR                                              CLA03560
ISN 0184         3001 CONTINUE                                                 CLA03570
                 C                                                             CLA03580
ISN 0185         3002   CONTINUE                                               CLA03590
                 C                                                             CLA03600
                 C  PRINT MODEL PARAMETERS, TOLERANCES AND CHI SQ.             CLA03610
ISN 0186            WRITE(6,6007) (ZX(K),SIGMA(K),K = 1,NTERM),XISQR           CLA03620
ISN 0187         6007 FORMAT(1H ,25X,'FINAL  ',1X,4(F8.2,'+-',F5.2),1X,F8.2)   CLA03630
                 C                                                             CLA03640
                 C  SAVE MODEL PARAMETERS TO USE FOR TEST FIELD                CLA03650
ISN 0188            TRANA = ZX(1)                                              CLA03660
ISN 0189            TRALPH = ZX(2)                                             CLA03670
ISN 0190            TRBETA = ZX(3)                                             CLA03680
ISN 0191            TRTO = ZX(4)                                               CLA03690
                 C                                                             CLA03700
                 C  ************************************************************CLA03710
                 C  ************************************************************CLA03720
                 C  SECTION 3--CREATE AND WRITE HEADER RECORD                   CLA03730
                 C                                                             CLA03740
                 C                                                             CLA03750
                 C     CLEAR THE HEADER RECORD AWAY.                           CLA03760
ISN 0192            DO 104 I = 1,3040                                          CLA03770
ISN 0193         104 IHEDNE(I) = 0                                             CLA03780
                 C                                                             CLA03790
                 C     LOAD DATA INTO HEADER RECORD.                           CLA03800
                 C                                                             CLA03810
                 C  COMPUTING SYSTEM ID (BYTES 1-12)                           CLA03820
ISN 0194            IHEDNE( 1) = KS                                            CLA03830
ISN 0195            IHEDNE( 2) = KP                                            CLA03840
ISN 0196            IHEDNE( 3) = KBLANK                                        CLA03850
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ISN 0197            IHEDHF( 4) = KM                                          CLA03860
ISN 0198            IHEDHF( 5) = KH                                          CLA03870
ISN 0199            IHEDHF( 6) = KL                                          CLA03880
ISN 0200            IHEDHF( 7) = KI                                          CLA03890
ISN 0201            IHEDHF( 8) = KHLANK                                      CLA03900
ISN 0202            IHEDHF( 9) = KT                                          CLA03910
ISN 0203            IHEDHF(10) = KE                                          CLA03920
ISN 0204            IHEDHF(11) = KM                                          CLA03930
ISN 0205            IHEDHF(12) = KP                                          CLA03940
ISN 0206            IHEDHF(13) = KW                                          CLA03950
ISN 0207            IHEDHF(14) = KHLANK                                      CLA03960
ISN 0208            IHEDHF(15) = KC                                          CLA03970
ISN 0209            IHEDHF(16) = KL                                          CLA03980
ISN 0210            IHEDHF(17) = KA                                          CLA03990
ISN 0211            IHEDHF(18) = KF                                          CLA04000
ISN 0212            IHEDHF(19) = KS                                          CLA04010
ISN 0213            IHEDHF(20) = KI                                          CLA04020
ISN 0214            IHEDHF(21) = KF                                          CLA04030
ISN 0215            IHEDHF(22) = KI                                          CLA04040
ISN 0216            IHEDHF(23) = KE                                          CLA04050
ISN 0217            IHEDHF(24) = KW                                          CLA04060
ISN 0218            DO 114 I = 25,52                                         CLA04070
ISN 0219      114   IHFDHF(I) = KHLANK                                       CLA04080
              C  SENSOR ID (1 - CHASSIFICATION FILE)                         CLA04090
ISN 0220            IHEDHF(53) = KI                                          CLA04100
ISN 0221            DO 115 I=54,60                                           CLA04110
ISN 0222      115   IHFDHF(I) = KHLANK                                       CLA04120
              C  CONVERT DATE OF PROCESSING TO LOGICAL*1 VALUES              CLA04130
ISN 0223            REWIND 30                                                CLA04140
ISN 0224            WRITE (30,1114) TODAY                                    CLA04150
ISN 0225      1114  FORMAT (A8)                                              CLA04160
ISN 0226            REWIND 30                                                CLA04170
ISN 0227            READ(30,1115) IMON, IDAY, IYEAR                          CLA04180
ISN 0228      1115  FORMAT (I2,1X,I2,1X,I2)                                  CLA04190
              C DATE OF PROCESSING - DAY                                     CLA04200
ISN 0229            IHEDHF(61) = IDAY                                        CLA04210
              C DATE OF PROCESSING - MONTH                                   CLA04220
ISN 0230            IHEDHF(62) = IMON                                        CLA04230
              C DATE OF PROCESSING - YEAR                                    CLA04240
ISN 0231            IHEDHF(63) = IYEAR                                       CLA04250
              C TAPE SEQUENCE NUMBER                                         CLA04260
ISN 0232            IHEDHF(64) = 1                                           CLA04270
              C  SEGMENT NUMBER                                              CLA04280
ISN 0233            REWIND 30                                                CLA04290
ISN 0234            WRITE (30,1124) KSEGM                                    CLA04300
ISN 0235      1124  FORMAT (A4)                                              CLA04310
ISN 0236            REWIND 30                                                CLA04320
ISN 0237            READ (30,1117) JSEGM                                     CLA04330
ISN 0238      1117  FORMAT (I4)                                              CLA04340
ISN 0239            IHEDHF(65)=RSEG(1)                                       CLA04350
ISN 0240            IHEDHF(66) = RSEG(2)                                     CLA04360
ISN 0241            IHEDHF(67) = RSEG(3)                                     CLA04370
ISN 0242            IHEDHF(68) = RSEG(4)                                     CLA04380
              C CHANNELS ACTIVE (10000000)                                   CLA04390
ISN 0243            IHEDHF(81) = K200                                        CLA04400
              C PROCESSING FLAG (1 - PROCESSED)                              CLA04410
ISN 0244            IHEDHF(89) = 1                                           CLA04420
              C NUMBER OF CHANNELS                                           CLA04430
ISN 0245            IHEDHF(90) = 1                                           CLA04440
              C NUMBER OF BITS PER BYTE                                      CLA04450
ISN 0246            IHEDHF(91) = K10                                         CLA04460
              C BYTE ADD. OF START OF DATA IN SCAN                           CLA04470
ISN 0247            IHEDHF(93) = 1                                           CLA04480
              C NUMBER OF PIXELS PER SCAN.                                   CLA04490
ISN 0248            IHEDHF(97) = K304                                        CLA04500
              C RECORD SIZE IN BYTES (360)                                   CLA04510
ISN 0249            IHEDHF(100) = 1                                          CLA04520
              C  LOW ORDER BYTES OF RECORD SIZE                              CLA04530
ISN 0250            IHEDHF(101) = K104                                       CLA04540
              C NUMBER OF RECORDS TO MAKE DATA SET                           CLA04550
ISN 0251            IHEDHF(104) = 1                                          CLA04560
              C LENGTH OF ANCILLARY BLOCK IN BYTES (70)                      CLA04570
ISN 0252            IHEDHF(106) = K10A                                       CLA04580
              C START PIXEL NUMBER                                           CLA04590
ISN 0253            IHEDHF(109) = 1                                          CLA04600
              C STOP PIXEL NUMBER                                            CLA04610
ISN 0254            IHEDHF(111) = K304                                       CLA04620
              C YOUNG LENGTH OF GENERATING COMPUTER (16)                     CLA04630
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ISN 0255            IHEDHF(753) = K20                                          CLA04640
                  C NUMBER OF DATA SETS PER RECORD                             CLA04650
ISN 0256            IHEDHF(1778) = 1                                           CLA04660
                  C NO. OF CHANNELS IN FIRST REC. OF DATA SET                  CLA04670
ISN 0257            IHEDHF(1784) = 1                                           CLA04680
                  C NUMBER OF ELEMENTS PER SCAN                                CLA04690
ISN 0258            IHEDHF(1788) = K304                                        CLA04700
                  C PIXEL SKIP FACTOR (PROCESS ALL PIXELS)                     CLA04710
ISN 0259            IHEDHF(1790) = 1                                           CLA04720
                  C SCAN SKIP FACTOR (PROCESS ALL SCANS)                       CLA04730
ISN 0260            IHEDHF(1792) = 1                                           CLA04740
                  C                                                            CLA04750
                  C     LOAD ACQUISITION DATES INTO HEADER RECORD.             CLA04760
                  C                                                            CLA04770
ISN 0261            DO 116 I = 1,5                                             CLA04780
                  C ACQ. DATE FOR FIRST ACQ.                                   CLA04790
ISN 0262            IHEDHF(2248+I)=ACQDTH(I,1)                                 CLA04800
                  C ACQ. DATE FOR SECOND ACQ.                                  CLA04810
ISN 0263            IHEDHF(2256+I)=ACQDTH(I,2)                                 CLA04820
                  C ACQ. DATE FOR THIRD ACQ.                                   CLA04830
ISN 0264            IHEDHF(2264+I)=ACQDTH(I,3)                                 CLA04840
                  C ACQ. DATE FOR FOURTH ACQ.                                  CLA04850
ISN 0265            IHEDHF(2272+I)=ACQDTH(I,4)                                 CLA04860
                  C ACQ. DATE FOR FIFTH ACQ.                                   CLA04870
ISN 0266            IHEDHF(2280+I)=ACQDTH(I,5)                                 CLA04880
ISN 0267            IF(NOACQS.GE.6) IHEDHF(2288+I)=ACQDTH(I,6)                 CLA04890
ISN 0269            IF(NOACQS.GE.7) IHEDHF(2296+I)=ACQDTH(I,7)                 CLA04900
ISN 0271            IF(NOACQS.EQ.8) IHEDHF(2304+I)=ACQDTH(I,8)                 CLA04910
ISN 0273  116       CONTINUE                                                   CLA04920
                  C                                                            CLA04930
                  C     LOAD DATA FOR PRODUCTION FILM CONVERTER.               CLA04940
                  C                                                            CLA04950
                  C N=1000 SCAN LINES PER FRAME                                CLA04960
ISN 0274            IHEDHF(2759) = 1                                           CLA04970
ISN 0275            DO 117 I = 2760, 2789                                      CLA04980
ISN 0276  117       IHEDHF(I) = KBLANK                                         CLA04990
                  C  JOB ID (BYTES 2760 - 2789)                                CLA05000
ISN 0277            IHEDHF(2760) = KS                                          CLA05010
ISN 0278            IHEDHF(2761) = KP                                          CLA05020
ISN 0279            IHEDHF(2762) = KC                                          CLA05030
ISN 0280            IHEDHF(2764) = KL                                          CLA05040
ISN 0281            IHEDHF(2765) = KA                                          CLA05050
ISN 0282            IHEDHF(2766) = KS                                          CLA05060
ISN 0283            IHEDHF(2767) = KS                                          CLA05070
ISN 0284            IHEDHF(2769) = KF                                          CLA05080
ISN 0285            IHEDHF(2770) = KO                                          CLA05090
ISN 0286            IHEDHF(2771) = KR                                          CLA05100
ISN 0287            DO 118 I = 1,4                                             CLA05110
                  C CROP OF INTEREST FROM INPUT DATA                           CLA05120
ISN 0288  118       IHEDHF(2772+I) = ICROP(I)                                  CLA05130
                  C DATE OF PROCESSING                                         CLA05140
                  C SCAN TYPE (1 - SMOOTHED)                                   CLA05150
ISN 0289            IHEDHF(2795) = 1                                           CLA05160
                  C CAMERA TYPE (1 - 5 INCH)                                   CLA05170
ISN 0290            IHEDHF(2797) = 1                                           CLA05180
                  C TRUNCATION (2 - NO TRUNCATION)                             CLA05190
ISN 0291            IHEDHF(2799) = 2                                           CLA05200
                  C CHANNELS REQUIRED (10000000)                               CLA05210
ISN 0292            IHEDHF(2800) = K200                                        CLA05220
                  C REPEAT OF PIXELS IN SCAN                                   CLA05230
ISN 0293            IHEDHF(2976)=6                                             CLA05240
                  C REPEAT OF SCANS                                            CLA05250
ISN 0294            IHEDHF(2977) = K10                                         CLA05260
                  C                                                            CLA05270
                  C     LOAD USER SUPPLIED DATA INTO HEADER RECORD.  THE DATA IS CLA05280
                  C     THE VERTICES OF THE FIELD USED TO TRAIN THE CLASSIFIER. CLA05290
                  C                                                            CLA05300
ISN 0295            IHEDHF(2941) = KT                                          CLA05310
ISN 0296            IHEDHF(2942) = KR                                          CLA05320
ISN 0297            IHEDHF(2943) = KBLANK                                      CLA05330
ISN 0298            IHEDHF(2944) = KF                                          CLA05340
ISN 0299            IHEDHF(2945) = KL                                          CLA05350
ISN 0300            IHEDHF(2946) = KD                                          CLA05360
ISN 0301            IHEDHF(2947) = KBLANK                                      CLA05370
ISN 0302            IHEDHF(2948) = KFINAL                                      CLA05380
                  C                                                            CLA05390
ISN 0303            REWIND 30                                                  CLA05400
ISN 0304            WRITE (30,4022) (VERTPX(I),VERTLN(I), I = 1,4)             CLA05410
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*LEVEL 2.3.0 (APR 78)          MAIN          OS/360  FORTRAN H EXTENDED          DATE 81.139/13.16.48      PAGE    8

 ISN 0305            REWIND 10                                                              CLA05420
 ISN 0306            READ (10,14022) (IHEDHF(I),I = 2949,2996)                              CLA05430
 ISN 0307      14022 FORMAT (48A1)                                                          CLA05440
CCCC  +WITE (3,14022) (IHEDHF(I),I = 2949,2996)                                           CLA05450
 ISN 0308       4022 FORMAT(4(1X,F4.0,1X,F4.0,1X))                                        CLA05460
C                                                                                         CLA05470
C       WRITE HEADER RECORD TO OUTPUT FILE                                                CLA05480
 ISN 0309            WRITE(4,8888) (IHEDHF(I),I = 1,3060)                                  CLA05490
 ISN 0310      8888  FORMAT (15(1X80A1))                                                  CLA05500
C                                                                                         CLA05510
C  ********************************************************************************     CLA05520
C  ********************************************************************************     CLA05530
C  SECTION 4--READS AND PROCESSES THE INDIVIDUAL PIXELS IN THE TEST FLD                   CLA05540
C  USING CONSTANTS CALCULATED IN SECT. 2 (XMNTRN, SGMATR, TRAINA, TRALPH                  CLA05550
C    AND CALLS -TROXM- TO CALCULATE ALPHA (IALPHF), BETA (IBETHF),                        CLA05560
C    TO (ITOHHF) AND SIGMA (ICHIHF) FOR EACH PIXEL IN THE TEST FLD                        CLA05570
C                                                                                         CLA05580
C                                                                                         CLA05590
 ISN 0311            ITYPE = 1                                                             CLA05600
C  READ HEADER AND COORDINATES FOR TEST FLD                                               CLA05610
 ISN 0312            CALL RDFLES (ITYPE, IHEDHF, VERTPX, VERTLN, IERROR)                   CLA05620
CCCC  IF (IERROR .NE. 0) STOP                                                             CLA05630
C                                                                                         CLA05640
C  DETERMIN LINE NUMBER AND PIXEL NUMBERS MAX AND MIN                                     CLA05650
 ISN 0313            LMAX = 1                                                              CLA05660
 ISN 0314            LMIN = 196                                                            CLA05670
 ISN 0315            MINPXL = 196                                                          CLA05680
 ISN 0316            MAXPXL = 1                                                            CLA05690
 ISN 0317            DO 106 KORNER = 1,4                                                   CLA05700
 ISN 0318            LINENO = VERTLN(KORNER)                                               CLA05710
 ISN 0319            IPIXEL = VERTPX(KORNER)                                               CLA05720
 ISN 0320            IF (LINENO .GT. LMAX) LMAX = LINENO                                   CLA05730
 ISN 0322            IF (LINENO .LT. LMIN) LMIN = LINENO                                   CLA05740
 ISN 0324            IF (IPIXEL .GT. MAXPXL) MAXPXL = IPIXEL                               CLA05750
 ISN 0326            IF (IPIXEL .LT. MINPXL) MINPXL = IPIXEL                               CLA05760
 ISN 0328      106   CONTINUE                                                              CLA05770
C                                                                                         CLA05780
C  IPRINT USED TO TRACK VALUE OF I                                                        CLA05790
 ISN 0329            IPRINT = -1                                                           CLA05800
C                                                                                         CLA05810
C   ***********  PROCESS INDIVIDUAL LINES OF TEST FLD ***********                         CLA05820
 ISN 0330            DO 740 KURLNE = LMIN, LMAX                                            CLA05830
 ISN 0331            LINENO = KURLNE                                                       CLA05840
C                                                                                         CLA05850
C   CLEAR THE BUFFER                                                                      CLA05860
 ISN 0332            DO 992 KRR = 1,196                                                    CLA05870
 ISN 0333            IALPHF(KRR) = 0                                                       CLA05880
 ISN 0334            IBETHF(KRR) = 0                                                       CLA05890
 ISN 0335            ICHIHF(KRR) = 0                                                       CLA05900
 ISN 0336      992   ITOHHF(KRR) = 0                                                       CLA05910
C                                                                                         CLA05920
C   READ DATA FOR ONE LINE OF PIXELS.                                                     CLA05930
C                                                                                         CLA05940
 ISN 0337            ITYPE = 2                                                             CLA05950
 ISN 0338            CALL RDFLES (ITYPE, IDATA, VERTPX, VERTLN, IERROR)                    CLA05960
CCCC  IF (IERROR .NE. 0) STOP                                                             CLA05970
C                                                                                         CLA05980
C  MOVE PIXEL DATA FROM UNMERGED FILES                                                    CLA05990
 ISN 0339            DO 412 KURACO = 1,NOACO                                               CLA06000
C                                                                                         CLA06010
 ISN 0340            DO 411 KURCHN = 1,4                                                   CLA06020
 ISN 0341            INCRF = (KURCHN - 1) * 196                                            CLA06030
 ISN 0342            DO 411 KURPXL = MINPXL, MAXPXL                                        CLA06040
C  SKIP OVER FIRST 72 CHARACTERS OF LEAD DATA ON TAPE RECORD                              CLA06050
 ISN 0343            LOC = INCRF + KURPXL + 72                                             CLA06060
 ISN 0344            IHOLD1(4) = IDATA(LOC,KURACO)                                         CLA06070
 ISN 0345            ICHIPX(KURPXL, KURCHN ,KURACO) = IHOLD4                               CLA06080
 ISN 0346      411   CONTINUE                                                              CLA06090
 ISN 0347      412   CONTINUE                                                              CLA06100
C                                                                                         CLA06110
C                                                                                         CLA06120
C     ***********  PROCESS PIXELS FOR CURRENT LINE  ***********                           CLA06130
 ISN 0348            DO 770 KURPXL = MINPXL, MAXPXL                                        CLA06140
 ISN 0349            IPIXEL = KURPXL                                                       CLA06150
C                                                                                         CLA06160
C  CHECK IF PIXEL IN TEST FIELD                                                           CLA06170
 ISN 0350            XLINE = LINENO                                                        CLA06180
 ISN 0351            XPIXEL = IPIXEL                                                       CLA06190
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ISN 0352            CALL RECT (XLINE, XPIXEL, VERTLN, VERTPX, ICOR)                    CLA06200
ISN 0353            IF (ICOR .EQ. 1) GO TO 770                                         CLA06210
                    C                                                                  CLA06220
                    C                                                                  CLA06230
                    C   REMOVE THE SCREEN FACTOR FROM  THE PIXEL IF NECESSARY.         CLA06240
ISN 0355            DO 432 II = 1,NOACOS                                               CLA06250
ISN 0356            IF (ICHNPX(IPIXEL,4,II) .GT. 128) ICHNPX(IPIXEL,4,II) =            CLA06260
                   1  ICHNPX(IPIXEL,4,II) - 128                                       CLA06270
ISN 0358        432 CONTINUE                                                           CLA06280
                    C                                                                  CLA06290
ISN 0359            DO 12 M = 1,NOACOS                                                 CLA06300
ISN 0360            INDEX = LANDST(M) - 1                                              CLA06310
ISN 0361            XPIXGR(M) = (  -.29 * ICHNPX(IPIXEL,1,M) * CLNOST(INDEX,1) -      CLA06320
                   1          .562 * ICHNPX(IPIXEL,2,M) * CLNOST(INDEX,2) +        CLA06330
                   2          .6   * ICHNPX(IPIXEL,3,M) * CLNOST(INDEX,3) +        CLA06340
                   3 .2455 * 2. * ICHNPX(IPIXEL,4,M) * CLNOST(INDEX,4) ) * SANG(M)+10.CLA06350
ISN 0362            IF(XPIXGR(M).LE.3.) GO TO 770                                      CLA06360
ISN 0364        12  CONTINUE                                                           CLA06370
                    C                                                                  CLA06380
                    C  MOVE MODEL VALUES CALC'D BY -TRJXM- FIT OF TRAINING FLD PIXELS TO ZX CLA06390
                    C     ARRAY ZX TO BE USED AS INPUT VALUES IN FITTING CURRENT TEST PIXEL CLA06400
ISN 0365            ZX(1) = TRAINA                                                     CLA06410
ISN 0366            ZX(2) = TRALPH                                                     CLA06420
ISN 0367            ZX(3) = TRBETA                                                     CLA06430
ISN 0368            ZX(4) = TRTO                                                       CLA06440
                    C                                                                  CLA06450
ISN 0369            XCHIN = 200.                                                       CLA06460
ISN 0370            XLAMDA = 1.E-03                                                    CLA06470
                    C                                                                  CLA06480
                    C  TRY UNTIL ACCEPTABLE FIT OR MAXIMUM OF 24 TIMES                 CLA06490
ISN 0371            DO 13 LA = 1,LIMIT                                                 CLA06500
ISN 0372            CALL TRJXM(XDAY,XPIXGR,SGMATR,NOACOS,  4,  MODE,ZX,BETA,SIGMA,     CLA06510
                   1 XLAMDA,DFIX,XISQR,0, WEIGHT, IPRINT)                              CLA06520
ISN 0373            XDIF = XCHI-XISQR                                                  CLA06530
ISN 0374            XTH = XISQR*TOL                                                    CLA06540
ISN 0375            IF(ABS(XDIF).LE.XTH) GO TO 14                                      CLA06550
ISN 0377            XCHIN = XISQR                                                      CLA06560
ISN 0378        13  CONTINUE                                                           CLA06570
ISN 0379        14  CONTINUE                                                           CLA06580
                    C                                                                  CLA06590
                    C  IPRINT IS A DEBUG SWITCH TO TRACK A(I), +1--NO PRINT            CLA06600
ISN 0380            IPRINT = +1                                                        CLA06610
                    C                                                                  CLA06620
                    C  CHECK LIMITS AND SAVE VALUES OF ALPHA, BETA, TO AND SIGMA AS INTEGERSCLA06630
                    C   ALPHA                                                         CLA06640
ISN 0381            XALPHA = 100*ZX(2)                                                 CLA06650
ISN 0382            IF(XALPHA.LE.0.0) GO TO 770                                        CLA06660
ISN 0384            IF(XALPHA.GE.9999.) XALPHA = 9999.                                 CLA06670
ISN 0386            IALPHA = XALPHA                                                    CLA06680
                    C                                                                  CLA06690
                    C  BETA                                                            CLA06700
ISN 0387            XBETA = 1000.*ZX(3)                                                CLA06710
ISN 0388            IF(XBETA.LE.0.0) XBETA = 0.0                                       CLA06720
ISN 0390            IF(XBETA.GE.9999.) XBETA = 9999.                                   CLA06730
ISN 0392            IBETA = XBETA                                                      CLA06740
                    C                                                                  CLA06750
                    C  TO                                                              CLA06760
ISN 0393            XTZERO = 1000*ZX(4)                                                CLA06770
ISN 0394            IF(XTZERO.GE.9999.) XTZERO = 9999.                                 CLA06780
ISN 0396            IF(XTZERO.LE.0.0) GO TO 770                                        CLA06790
ISN 0398            ITZERO = XTZERO                                                    CLA06800
                    C                                                                  CLA06810
                    C  SIGMA                                                           CLA06820
ISN 0399            XCHISQ = 10.*XISQR                                                 CLA06830
ISN 0400            IF(XCHISQ.GE.9999.) XCHISQ = 9999.                                 CLA06840
ISN 0402            ICHISQ = XCHISQ                                                    CLA06850
                    C                                                                  CLA06860
                    C  MOVE ALPHA, BETA, TO AND SIGMA TO OUTPUT BUFFER                 CLA06870
ISN 0403            IALPHF(I2IXEL) = IALPHA                                            CLA06880
ISN 0404            IBETAF(I2IXEL) = IBETA                                             CLA06890
ISN 0405            ITOHF(IPIXEL) = ITZERO                                             CLA06900
ISN 0406            ICHIF(IPIXEL) = ICHISQ                                             CLA06910
                                                                                       CLA06920
                    C  CONTINUE PROCESSING PIXELS IN LINE UNTIL END OF PIXEL DO LOOP    CLA06930
ISN 0407        770 CONTINUE                                                           CLA06940
                    C                                                                  CLA06950
                    C                                                                  CLA06960
ISN 0408            WRITE(4,8888)((IALPHF(N),IBETAF(N),ITOHF(N),ICHIF(N)),N=M,NPXL,    CLA06970
```

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*LEVEL 2.3.0 (JUNE 78)          MAIN          OS/360  FORTRAN H EXTENDED          DATE 81.139/13.16.48       PAGE  10

                     1  MAXPXL)                                                                    CLA06980
   ISN 0409      8883  FORMAT (1H(45A4))                                                          CLA06990
                 CCCC  IF (I.NE.NO.EQ.1) WRITE(6,999) (IALPHF(N), IHEIHF(N), ITOHUF(N),          CLA07000
                 CCCC 1  ICHIHF(N), N = 1,20)                                                    CLA07010
   ISN 0410      999   FORMAT (' ALPHA, BETA, TO, CHI SQ=',4I6)                                   CLA07020
                 C                                                                              CLA07030
                 C  CONTINUE PROCESSING LINES, UNTIL END OF LINE DO LOOP                        CLA07040
   ISN 0411      780       CONTINUE                                                             CLA07050
                 C                                                                              CLA07060
                 C                                                                              CLA07070
                 C  ##########################################                                  CLA07080
                 C  CALCULATE AND PRINT ELAPSED TIMES FOR PROGRAM                               CLA07090
   ISN 0412            CALL CPTIME (TODAY, NTIME, NCPTIM,NVCPTM)                                CLA07100
   ISN 0413            TIMECP = (NCPTIM - ICPTIM) / 6000.                                       CLA07110
   ISN 0414            TIMEVR = (NVCPTM - IVCPTM) / 6000.                                       CLA07120
   ISN 0415            WRITE (6,6010) TIMECP, TIMEVR                                            CLA07130
   ISN 0416      6010 FORMAT(///,10X,'CLASSIFICATION FILE -   RUN TIME:  CP=',F6.2,             CLA07140
                    1   ' VIRTUAL CP=',F6.2,' IN MINUTES')                                      CLA07150
                 C                                                                              CLA07160
   ISN 0417            IDIFFC = NCPTIM - ICPTIM                                                 CLA07170
   ISN 0418            IDIFFV = NVCPTM - IVCPTM                                                 CLA07180
   ISN 0419            WRITE (6,6011) IDIFFC, IDIFFV                                            CLA07190
   ISN 0420      6011  FORMAT (///,'  DIFFERENCE IN INITIAL, ENDING CP TIMES IN HUNDREDTHSCLA07200
                    1 SECS.=',I6,/,'  DIFFERENCE IN INITIAL, ENDING VIRTUAL TIMES IN CLA07210
                    2HUNDREDTHS SECS.=',I6)                                                     CLA07220
                 C                                                                              CLA07230
                 C                                                                              CLA07240
   ISN 0421            STOP                                                                     CLA07250
   ISN 0422            END                                                                      CLA07260

                        ******F O R T R A N    C R O S S    R E F E R E N C E    L I S T I N G******
SYMBOL   INTERNAL STATEMENT NUMBERS
I        0046 0047 0050 0050 0050 0051 0051 0051 0061 0062 0063 0065 0068 0077 0078 0078 0089 0089 0089
         0089 0150 0160 0160 0160 0162 0163 0167 0173 0174 0174 0174 0192 0193 0218 0219 0221 0222 0261 0262
         0262 0263 0263 0264 0264 0265 0265 0266 0266 0267 0267 0269 0269 0271 0271 0275 0276 0287 0288
         0288 0304 0304 0304 0304 0304 0306 0306 0306 0309 0309 0309
J        0128 0129 0134 0135 0136 0136 0136 0136 0136 0136 0136
K        0151 0152 0152 0186 0186 0186 0186
M        0150 0152 0155 0156 0157 0157 0157 0359 0360 0361 0361 0361 0361 0361 0361 0361 0362
N        0408 0408 0408 0408 0408 0408
II       0355 0356 0356 0356
JM       0081 0082 0082 0082 0095 0096 0097
KA       0025 0029 0210 0281
KB       0025 0029
KC       0025 0028 0208 0279
KD       0025 0026 0300
KE       0025 0029 0203 0215
KF       0025 0028 0214 0284 0299
KG       0025 0029
KH       0025 0029
KI       0025 0029 0213 0215
KJ       0025 0029
KK       0025 0029
KL       0025 0029 0199 0209 0280 0299
KM       0025 0029 0197 0204
KN       0025 0029
KO       0025 0030 0285
KP       0025 0030 0205
KR       0025 0030 0195 0206 0217 0278 0246 0206
KS       0025 0030 0194 0211 0212 0277 0282 0283
KT       0026 0030 0200 0202 0295
KU       0026 0030 0198
KV       0026 0220
LA       0176 0371
ZX       0010 0167 0178 0186 0188 0189 0190 0191 0365 0366 0367 0368 0372 0381 0387 0393
ABS      0181 0375
ANG      0065 0066 0066 0068
III      0072 0072 0072 0074 0074 0074
KHA      0332 0333 0334 0335 0336
K10      0038 0264 0294
K20      0038 0264
LOC      0116 0117 0343 0344
SIN      0068
XTH      0180 0181 0374 0375
ASEG     0023 0024 0239 0240 0241 0242
DATE     0006
ICOR     0125 0126 0352 0353
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT	NUMBERS															
IDAY	0023	0227	0229															
IMON	0023	0227	0230															
KREP	0080	0082	0157															
K100	003B	0252																
K150	003B	0250																
K200	003B	0241	0292															
K304	003B	0244	0254	0258														
LMAX	0091	0098	0098	0109	0313	0320	0320	0330										
LMIN	0092	0100	0100	0108	0114	0322	0322	0330										
MODE	0036	0178	0372															
OFIX	001B	0178	0372															
RECT	0125	0352																
SAVG	0012	0062	0068	0136	0361													
SDEV	0154																	
TRTO	0191	0368																
XDAY	0017	0079	0178	0372														
XDIF	0179	0181	0373	0375														
XTOL	003A	0190	0374															
ACODT	0006	0007	0009	0072	0160													
CROPG	0045																	
IBETA	0392	0404																
ICROP	0010	0085	0238															
IDATA	0003	0004	0111	0117	0338	0344												
IDATE	0020	0074	0078	0082	0082													
INCRE	0114	0116	0341	0343														
INDEX	0135	0136	0136	0136	0136	0360	0361	0361	0361	0361								
ITYPE	0087	0088	0110	0111	0311	0312	0337	033A										
IYEAR	0023	0227	0231															
JSFGM	0024	0237																
KSFGM	0006	0035	0234															
LIMIT	0037	0371																
NMODE	0171	0178																
NOACO	0006	0044	0050	0051	0060	0072	0074	0112	0160	0339								
NTERM	0172	017A	0186															
NTIME	0014	0412																
PELTA	0021	0178	0372															
SIGMA	0021	0178	0186	0372														
STIME	0014	0039	0085	0085														
TODAY	0013	0039	0085	0224	0412													
TRJXM	017A	0372																
XBETA	0387	0398	0398	0398	0398	0392												
XCHIN	0170	0179	0183	0369	0373	0377												
XISQR	017B	0179	0180	0183	0186	0372	0373	0374	0377	0399								
XLINE	0123	0125	0350	0352														
XMEAN	0154	0155																
ACODTR	000B	0009	0262	0263	0264	0265	0266	0267	0269	0271								
CLNDST	0016	0032	0032	0032	0033	0034	0034	0034	0035	0136	0136	0136	0136	0361	0361	0361	0361	
CPTIME	0039	0412																
ERRSET	0040	0041	0042															
IALPBF	0022	0334	0403	0408														
IALPHA	0386	0403																
IBETAF	0022	0334	0404	0408														
ICHIBF	0022	0335	0406	0408														
ICHISQ	0402	0406																
ICHNPX	0015	0119	0129	0136	0136	0136	0136	0345	0356	0356	0356	0361	0361	0361	0361			
ICPTIM	0039	0413	0417															
IDIFFC	0417	0419																
IDIFFV	041A	0419																
IERROR	0045	0057	0088	0111	0312	033B												
IHEDBF	0022	0088	0193	0194	0195	0196	0197	0198	0199	0200	0201	0202	0203	0204	0205	0206	0207	0208	0209
	0210	0211	0212	0213	0214	0215	0216	0217	0219	0220	0222	0229	0230	0231	0232	0239	0240	0241	0242
	0243	0244	0245	0246	0247	0248	0249	0250	0251	0252	0253	0254	0255	0256	0257	0258	0259	0260	0262
	0263	0264	0265	0266	0267	0269	0271	0274	0276	0277	027A	0279	0280	0281	0282	0283	0284	0285	0286
	0288	0289	0290	0291	0292	0293	0294	0295	0296	0297	0298	0299	0300	0301	0302	0306	0309	0312	
IHOLD1	0004	0005	0117	0344															
IHOLD4	0005	0031	0118	0345															
IPIEFL	0097	0102	0102	0104	0104	0122	0124	0129	0136	0136	0136	0136	0419	0324	0324	0326	0326	0349	0351
	0356	0356	0356	0361	0361	0361	0361	0403	0404	0405	0406								
IPRINT	0177	017B	0329	0472	0480														
ITZERO	0398	0405																	
ITOBUF	0022	0336	0405	0408															
IVCPTM	0039	0414	0418																
KBLANK	0027	0031	0196	0201	0207	0219	0222	0275	0297	0301									
KEQUAL	0027	0302																	
KORNER	0317	0319	0319																

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL INTERNAL STATEMENT NUMBERS

KURACO	0112	0117	0118	0339	0344	0345									
KURCHN	0113	0114	0118	0340	0341	0345									
KURLNF	0108	0109	0330	0331											
KURPXL	0115	0116	0118	0121	0122	0342	0343	0345	0348	0349					
LANDST	0006	0135	0360												
LINENO	0003	0096	0098	0098	0100	0100	0109	0123	0318	0320	0320	0322	0322	0331	0350
MAXPXL	0096	0102	0102	0115	0121	0316	0324	0324	0342	0348	0404				
MINPXL	0093	0104	0104	0115	0121	0315	0326	0326	0342	0348	0404				
NCPTIM	0412	0413	0417												
NOACOS	0003	0050	0051	0128	0134	0150	0173	0178	0267	0269	0271	0355	0359	0372	
NOTPPX	0107	0132	0132	0136	0139	0143	0145	0151	0154	0160					
NVCPTM	0412	0414	0414												
NXTLNF	0003														
PDFXFC	0043														
PDFLFS	0088	0111	0312	0338											
SAMGGG	0010	0011	0047	0047	0050	0051	0063	0065							
SGMATR	0020	0156	0157	0157	0161	0174	0174	0178	0372						
SIGNAG	0154	0154													
TIMECP	0413	0415													
TIMEVR	0414	0415													
TRAINA	0188	0365													
TRAIPH	0189	0366													
THRETA	0190	0367													
VERTLN	0019	0088	0089	0096	0111	0125	0304	0312	0318	0338	0352				
VERTPX	0018	0098	0099	0097	0111	0125	0304	0312	0319	0338	0352				
WEIGHT	0013	0174	0178	0372											
XALPHA	0381	0382	0384	0384	0386										
XCHISQ	0398	0400	0400	0402											
XGREEN	0019	0136	0152												
XLAMDA	0169	0174	0370	0372											
XPHITN	0021	0155	0163	0178											
XPIXEL	0124	0125	0351	0352											
XPIXGR	0021	0361	0362	0372											
XTZERO	0393	0394	0394	0396	0398										
YGREEN	0020	0152	0154												

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES				
1	0084	0091				
3	0060	0061	0063			
5	0079	0077				
6	0060	0046				
7	0054	0050	0051			
8	0057	0047				
9	0055	0052	0053			
12	0364	0359				
13	0378	0371				
14	0379	0375				
17	0075	0072				
18	0076	0074				
24	0106	0095				
26	0131	0128				
27	0138	0134				
28	0147	0139				
29	0159	0150				
31	0153	0151				
48	0150	0143				
49	0119	0113	0115			
50	0120	0112				
77	0141	0121	0126	0129		
78	0142	0108				
104	0193	0192				
106	0324	0317				
114	0219	0218				
115	0222	0221				
116	0273	0261				
117	0276	0275				
118	0288	0287				
190	0007					
411	0346	0340	0342			
412	0347	0339				
432	0358	0355				
770	0407	0348	0353	0362	0382	0395
780	0411	0130				

***** F O R T R A N C R O S S R E F E R E N C E L I S T I N G *****

LABEL	DEFINED	REFERENCES
950	0146	0145
992	0334	0332
999	0410	
1114	0225	0224
1115	0228	0227
1117	0238	0237
1124	0235	0234
2999	0174	0173
3001	0184	0176
3002	0185	0181
4022	0308	0304
6000	0086	0085
6002	0090	0089
6003	0161	0160
6004	0164	0163
6005	0166	0165
6006	0168	0167
6007	0187	0186
6010	0415	0415
6011	0420	0419
8888	0310	0309
8889	0409	0404
9001	0148	0147
9994	0175	
9995	0137	
9996	0133	
9997	0070	
9998	0059	
9999	0044	
14022	0307	0305

/ MAIN / SIZE OF PROGRAM 009F64 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	000940	J	SF	I*4	000950	K	SF	I*4	000954	M	SF	I*4	000958
N	SF	I*4	000950	II	SF	I*4	000960	JM	SF	I*4	000964	KA	F	L*1	000930
KB		L*1	000931	KC	F	L*1	000932	KD	F	L*1	000933	KE	F	L*1	000934
KF	F	L*1	000935	KG		L*1	000936	KH		L*1	000937	KI	F	L*1	000938
KJ		L*1	000939	KK		L*1	00093A	KL	F	L*1	00093B	KM	F	L*1	00093C
KN		L*1	000930	KO	F	L*1	00093E	KP	F	L*1	00093F	KR	F	L*1	000940
KS	F	L*1	000941	KT	F	L*1	000942	KU	F	L*1	000943	KL	F	L*1	000944
LA	SF	I*4	000968	ZX	SFA C	R*4	000010	ANG	SFA	R*4	00096C	III	F	I*4	000970
KHH	SF	I*4	000974	K10	F	I*4	000978	K20	F	I*4	00097C	LOC	SF	I*4	000980
SIN	F XF	R*4	000000	XTH	S	R*4	000984	HSFG	F E	L*1	000980	DATE	C	I*4	NR
ICOR	SFA	I*4	000988	IDAY	SF	L*1	000945	IMON	SF	L*1	000946	KREP	S	I*4	00098C
K106	F	I*4	000990	K150	F	I*4	000994	K200	F	I*4	000998	K304	F	I*4	00099C
LMAX	SF	I*4	0009A0	LMIN	SF	I*4	0009A4	MODE	SFA	I*4	0009A8	QFIX	SFA	R*4	001674
QFCT	SF XF		000000	SANG	SF	R*4	001694	SDEV	SF XF		000000	IRTO	SF	R*4	0009AC
XDAY	SFA	R*4	001684	XDIF	SFA	R*4	0009B0	XTOL	F	R*4	0009B4	ACODT	F CE	R*8	000008
CROPG	SF XF		000000	IBETA	SF	I*4	0009B8	ICROP	F C	I*4	000000	IDATA	SFA C	L*1	000008
IDATE	SF	I*4	001604	INCRE	SF	I*4	0009BC	INDEX	SF	I*4	0009C0	ITYPE	SFA	I*4	0009C4
IYEAR	SF	L*1	000947	JSEGM	S E	I*4	00B780	KSEG4	F C	I*4	000048	LIMIT	F	I*4	0009C8
NMODF	SFA	I*4	0009CC	NOACO	I C	I*4	000008	NTERM	SFA	I*4	0009D0	NTIME	SFA	I*2	001664
PELTA	SFA	R*4	001684	SIGMA	SFA	R*4	001704	STIME	SFA			TODAY	SFA	R*8	000A38
TOJXM	SF XF		000000	XBETA	SF	R*4	0009D4	XCHIN	SF	R*4	0009D8	XISQR	SFA	R*4	0009DC
XLINF	SFA	R*4	6009E0	XMEAN	SFA	R*4	0009E4	ACODTH	F CE	L*1	000008	CLNDST	F	R*4	001714
CPTIMF	SF XF		000000	FORSET	SF XF		000000	IALPRF	SF	I*4	001734	IALPHA	SF	I*4	0009E8
IPCONF	F XF	I*4	000000	IRETHF	SF	I*4	001A44	ICHIRF	SF	I*4	001054	ICHISQ	SF	I*4	0009EC
ICHNPX	SF	I*4	002SA8	ICPTIM	SFA	I*4	0009F0	IDIFFC	SF	I*4	0009F4	IDIFFV	SF	I*4	0009F8
IERROR	SFA	I*4	0009FC	IHEDHF	SFA	L*1	000A70	IHOLDI	S E	L*1	0087A8	IHOLD4	F E	I*4	0087A8
IPIXEL	SF	I*4	000A00	IPRINT	SFA	I*4	000A04	ITZERO	SF	I*4	000A08	ITOALF	SF	I*4	002064
IVCPTM	SFA	I*4	000A0C	KHLAIM	F	L*1	000942	KEQUAL	F	L*1	000949	KORNER	SF	I*4	000A10
KURACO	SF	I*4	000A14	KURCHI	SF	I*4	000A18	KURLNE	SF	I*4	000A1C	KURPXL	SF	I*4	000A20
LANDST	F C	I*4	000A5C	LINEND	SF C	I*4	000A34	MAXPXL	SF	I*4	000A24	MINPXL	SF	I*4	000A28
NCPTIM	SFA C	I*4	000A2C	NOACOS	SFA C	I*4	001ACH	NOTHPX	SFA	I*4	000A30	NVCPTM	SFA	I*4	000A34
NXTLNF	C	I*4	NU	ROFXEC	SF XF		000000	RULES	SF XF		000000	SANGGG	F C	I*4	000000
SGMATR	SFA	R*4	002374	SIGMAG	SFA	R*4	000A38	TIMECH	SF	R*4	000A3C	TIMEVR	SF	R*4	000A40
TRAINA	SF	R*4	000A44	TRALPH	SF	R*4	000A48	TWBETA	SF	R*4	000A4C	VERTLN	SFA	R*4	002394
VERTPX	SFA	R*4	002384	WEIGHT	SFA	R*4	002568	XALPHA	SF	R*4	000A50	XCHISQ	SF	R*4	000A54
XGREEN	SF	R*4	002384	XLAMDA	SFA	R*4	000A58	XMNTHN	SFA	R*4	0024F4	XPIXEL	SFA	R*4	000A5C
XPIXGN	SFA	R*4	002514	XTZERO	SF	R*4	000A60	YGREEN	SFA	R*4	00253C				

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * LINES* SIZE OF BLOCK 000ACC HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
MAXLINE	I*4	000000 NR	LINENO	I*4	000004	IDATA	I*1	000008	NOACOS	I*4	000AC8

NAME OF COMMON BLOCK * MISC* SIZE OF BLOCK 00007C HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NOACO	I*4	000000	ACODT	R*8	000008	KSEGM	I*4	000048	DATE	I*4	00004C NR
LANDST	I*4	000050									

EQUIVALENCED VARIABLES WITHIN THIS COMMON BLOCK

VARIABLE	OFFSET	VARIABLE	OFFSET	VARIABLE	OFFSET	VARIABLE	OFFSET
ACODTH	000008						

NAME OF COMMON BLOCK * USER* SIZE OF BLOCK 000040 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IGROP	I*4	000000	?x	R*4	000010	SANGGG	I*4	000020			

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
6	49	008BAE	8	57	008C5E	3	69	008A04	5	79	008AC8
1	84	008B10	199	87	008B6C NR	24	106	008C80	49	119	008D3E
50	120	008D66	26	131	008E00	27	138	008F48	77	141	008F6C
78	142	008F80	28	143	008F94	48	150	008FDE	31	153	009010
29	159	009076	2999	174	00916C	3001	184	0091F8	3002	185	00920C
104	193	0092BC	114	219	009374	115	222	0093A4	116	273	0095E8
117	276	009600	118	288	009644	106	328	0098C2	992	336	00992C
411	346	0099DE	412	347	009A06	432	358	009AD4	12	364	009C1A
13	378	009C9C	14	379	009C30	770	407	009D0E	748	411	009E64

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100000	1	008910	100001	47	00894A	100002	50	0089C6	100007	58	008968
100008	60	008976	100009	62	0089BE	100010	65	008A30	100011	67	008A9C
100012	68	008AE8	100013	70	008A18	100014	78	008A9C	100019	80	008ADC
100020	82	008AEC	100021	83	008B08	100022	85	008B28	100023	86	008B9R
100024	90	008BCC	100025	96	008BF0	100026	99	008C38	100027	100	008C3C
100028	101	008C4C	100029	102	008C58	100030	103	008C64	100031	104	008C6C
100032	105	008C78	100033	107	008C94	100034	109	008CA4	100035	113	008CCA
100036	116	008CD2	100037	116	008CEA	100038	120	008D52	100040	121	008D7E
100041	122	008D86	100042	128	008DD6	100043	129	008DDE	100044	132	008E18
100045	135	008E2C	100046	139	008E60	100049	145	008FA0	100050	151	008FF6
100051	152	008FEF	100052	154	009024	100053	154	009054	100054	160	009088
100057	175	0091B4	100058	177	0091HC	100059	183	0091F0	100061	186	009224
100062	186	009258	100063	194	0092AC	100064	220	009394	100065	223	0093C4
100066	249	0094F0	100066	262	009558	100067	268	009598	100068	269	0095A8
100069	270	0095H8	100070	271	0095C8	100071	272	0095D8	100072	274	0095FC
100073	277	009620	100074	289	0096AC	100075	304	009768	100076	304	00979C
100081	318	009832	100082	321	009A7A	100083	322	009B7F	100084	323	009B8E
100085	324	009B9A	100086	325	009BA6	100087	326	009BAE	100088	327	009BBA
100089	329	009BD6	100090	331	009BEB	100091	333	009BFC	100092	337	009950
100093	340	009976A	100094	341	009972	100095	343	009998	100096	347	0099F2
100098	348	009A1E	100099	349	009A26	100100	355	009A76	100101	356	009A7E
100102	357	009AA0	100103	359	009AEC	100104	360	009AF4	100105	365	009C32
100106	372	009C6A	100107	377	009C94	100109	344	009CCA	100110	385	009CD2
100111	386	009CDA	100112	389	009D02	100113	390	009D0A	100114	391	009D16
100115	392	009D1E	100116	395	009D48	100117	396	009D50	100118	398	009D5A
100119	401	009DA4	100120	402	009D4C	100121	404	009DF2	100122	408	009E0C
100123	409	009E60	100124	412	009E78						

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
9999	44	000028 NR	7	54	000065	9	55	000088	9998	59	0000B8 NR
9997	78	000005 NR	17	75	0000EF	18	76	000104	6000	86	00010F
6002	90	000186	9996	133	0001E5 NR	9995	137	0001FF NR	950	146	000223
9001	148	000288	6003	161	0002AD	6004	164	00033F	6005	166	00036A
6006	168	0003C5	9994	175	000B73 NR	6007	187	000420	1114	225	000444
1115	228	000448	1124	235	000454	1117	238	000458	14022	307	0004SC

```
*LEVEL 2.3.0 (JUNE 78)          MAIN          OS/360  FORTRAN H EXTENDED          DATE 81.139/13.16.49          PAGE  15
     4022  309  000462          8088  310  000477          8989  409  000480          949  410  000489 NR
     6010  415  0004AA          6011  426  0004FA
*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
*OPTIONS IN EFFECT*SOURCE EXPDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)
*STATISTICS*      SOURCE STATEMENTS =      421, PROGRAM SIZE =     40804, SUBPROGRAM NAME =  MAIN
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                  212K BYTES OF CORE NOT USED
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*LEVEL 2.3.0 (APR 78)                    OS/360  FORTRAN H EXTENDED          DATE 81.139/13.20.22       PAGE   1

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002            SUBROUTINE CROPG (IERROR)                                                    CR000010
                  C                                                                                 CR000020
   ISN 0003            IMPLICIT INTEGER (A-Z)                                                       CR000030
                  C                                                                                 CR000040
                  C  CROPGF:  READ AND ANALYZE LINES DESCRIBING THE FOLLOWING--                     CR000050
                  C    CROP      CROP TO BE EVALUATED  (4A1)                                        CR000060
                  C    INITIAL VALUES FOR 4 CHANNELS                                              CR000070
                  C                                                                                 CR000080
                  C                                                                                 CR000090
   ISN 0004            COMMON /USER/ ICROP(4),ZX(4),SUNANG(8)                                       CR000100
   ISN 0005            REAL*4 ZX                                                                    CR000110
   ISN 0006            DIMENSION LINE(80), ITEMP(64)                                                CR000120
                  C                                                                                 CR000130
   ISN 0007            DIMENSION ITYPES(5)                                                          CR000140
                  C                    1       2       3       4                                    CR000150
   ISN 0008             DATA ITYPES /'CROP', 'GWEE', 'COMM','SUNA','END'/                           CR000160
                  C                                                                                 CR000170
   ISN 0009            DATA IBLANK/' '/                                                             CR000180
                  C                                                                                 CR000190
                  C     ***********  INITIALIZE VARIABLES SET FROM CROP FILE   ***********          CR000200
                  C                                                                                 CR000210
   ISN 0010            IERROR = 0                                                                   CR000220
                  C                                                                                 CR000230
   ISN 0011            DO 3 I = 1,4                                                                 CR000240
   ISN 0012            ICROP(I) = IBLANK                                                            CR000250
   ISN 0013            ZX(I) = 0.                                                                   CR000260
   ISN 0014          3 CONTINUE                                                                     CR000270
                  C                                                                                 CR000280
                  C                                                                                 CR000290
                  C  ********  WRITE HEADING FOR CROP INFORMATION SUMMARY  ***********              CR000300
   ISN 0015            WRITE(6,610)                                                                 CR000310
   ISN 0016         610 FORMAT(' CROP INFORMATION SUMMARY',//,' TYPE  DATA',/)                       CR000320
                  C                                                                                 CR000330
                  C        ***********  READ LINE, PRINT LINE ON SUMMARY  ********                  CR000340
                  C  READ LINE                                                                      CR000350
   ISN 0017         4    READ (21,1000) KRDTYP, (LINE(II), II=11,80)                                 CR000360
   ISN 0018         1000 FORMAT (A4, 6X, 70A1)                                                       CR000370
                  C                                                                                 CR000380
                  C  WRITE INPUT LINE ON SUMMARY REPORT                                             CR000390
   ISN 0019            WRITE (6,1001) KRDTYP, (LINE(II),II=11,80)                                   CR000400
   ISN 0020         1001  FORMAT (1X, A4,2X,70A1)                                                   CR000410
                  C                                                                                 CR000420
                  C   ************  ANALYZE LINE  **************                                    CR000430
                  C  DETERMINE LINE TYPE                                                            CR000440
   ISN 0021            DO 5 I=1,5                                                                   CR000450
   ISN 0022            IF (KRDTYP .EQ. ITYPES(I)) GO TO (10, 20, 4, 40, 50), I                      CR000460
   ISN 0024          5 CONTINUE                                                                     CR000470
                  C                                                                                 CR000480
                  C  INVALID LINE TYPE                                                              CR000490
   ISN 0025            WRITE(6,630)                                                                 CR000500
   ISN 0026         630 FORMAT(' INVALID INPUT LINE----PROGRAM WILL ABORT AFTER READING AL CR000510
                       IL USER DATA',/)                                                             CR000520
   ISN 0027            IERROR = 1                                                                   CR000530
   ISN 0028            GO TO 4                                                                      CR000540
                  C                                                                                 CR000550
                  C   ************  VALID LINE TYPES, PROCESS DATA  ***********                     CR000560
                  C  CROP LINE                                                                      CR000570
   ISN 0029         10   INDXCOP = 1                                                                CR000580
   ISN 0030              INDEX = 10                                                                  CR000590
   ISN 0031         11   INDEX = INDEX + 1                                                          CR000600
   ISN 0032              IF (INDEX .GT. 80) GO TO 4                                                  CR000610
   ISN 0034              IF (LINE(INDEX) .EQ. IBLANK  .OR. LINE(INDEX).EQ.KCOMMA) GO TO 11 CR000620
   ISN 0036              ICROP(INDXCOP) = LINE(INDEX)                                                CR000630
   ISN 0037              INDXCOP = INDXCOP + 1                                                       CR000640
   ISN 0038              IF (INDXCOP .GE. 5) GO TO 4                                                 CR000650
   ISN 0040              GO TO 11                                                                    CR000660
                  C                                                                                 CR000670
                  C  INITIAL GREENESS VALUES LINE                                                   CR000680
   ISN 0041         20   NOTAT = INPUTL(LINE,ZX)                                                     CR000690
   ISN 0042              IF (NOTAT .NE. 4) GO TO 125                                                 CR000700
   ISN 0044              GO TO 4                                                                     CR000710
                  C  ERROR ON INITIAL GREEN LINE                                                    CR000720
   ISN 0045         125  WRITE (6,126)                                                              CR000730
```

```
   ISN 0046      125  FORMAT (' ERROR ON INITIAL GREENNESS LINE. MUST BE 4 INITIAL QUES  CR000740
                     1SES FOR EACH SET OF GREENNESS VALUES', /, ' PROGRAM WILL STOP')    CR000750
   ISN 0047          STOP                                                               CR000760
                C                                                                      CR000770
                C                                                                      CR000780
                C  SUNANGLE CARD                                                       CR000790
   ISN 0048     40   CALL NEWUP (LINE,SUNANG)                                          CR000800
   ISN 0049          GO TO 4                                                          CR000810
                C                                                                      CR000820
                C  *ERROR LINE                                                         CR000830
   ISN 0050     50   CONTINUE                                                         CR000840
                C                                                                      CR000850
   ISN 0051          RETURN                                                           CR000860
   ISN 0052          END                                                              CR000870
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT NUMBERS					
I	0011	0012	0013	0021	0022	0022	
II	0017	0017	0017	0019	0019		
IX	0004	0005	0013	0041			
LINE	0006	0017	0019	0034	0034	0036	0041	0048
CROPG	0002							
ICROP	0004	0012	0036					
INDEX	0030	0031	0031	0032	0034	0034	0036	
ITEMP	0006							
NOINT	0041	0042						
NUMBR	0048							
IBLANK	0000	0012	0036					
IERROR	0002	0019	0027					
ITYPES	0007	0008	0022					
KCOMMA	0034							
KRDTYP	0017	0019	0022					
NDXCRP	0029	0036	0037	0037	0038			
NUMHFL	0041							
SUNANG	0004	0048						

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES					
3	0014	0011					
4	0017	0022	0028	0032	0039	0044	0049
5	0024	0021					
10	0029	0022					
11	0031	0034	0040				
20	0041	0022					
46	0044	0022					
50	0050	0022					
125	0045	0042					
126	0046	0045					
490	0026	0025					
630	0016	0015					
1000	0018	0017					
1001	0020	0019					

/ CROPG / SIZE OF PROGRAM 000570 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	000100	II	F	I*4	000104	IX	SFA C	I*4	000010	LINE	SFA	I*4	0001F8
CROPG	S	I*4	000108	ICROP	S C	I*4	000000	INDEX	SF	I*4	00010C	ITEMP		I*4	NR
NOINT	S	I*4	0001E0	NUMBR	SF XF		000000	KCOMMA	F XF	I*4	000000	IBLANK	F	I*4	0001E4
IERROR	S	I*4	0001E8	ITYPES		I*4	000334	KCOMMA		I*4	0001EC	KRDTYP	SF	I*4	0001F0
NDXCRP	SF	I*4	0001F4	NUMHFL	F XF	I*4	000000	SUNANG	SFA C	I*4	000020				

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK = #BLNK# SIZE OF BLOCK 000040 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
ICROP	I*4	000000	IX	I*4	000010	SUNANG	I*4	000020			

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR

```
     3   14  000394          4   17  000BCA          5   24  00045A         10   29  000486
    11   31  0004AC         20   41  0004DC        125   45  0004F2         40   48  000516
```

COMPILER GENERATED LABELS

```
LABEL  ISN  ADDR     LABEL  ISN  ADDR     LABEL  ISN  ADDR     LABEL  ISN  ADDR
100001   2  000360   100002  12  000394   100003  15  000384   100008  22  00042C
100009  24  000440   100011  25  00046A   100012  34  000496   200001  35  0004A8
100013  36  0004B4   100014  40  0004DA   100015  44  0004FE
```

FORMAT STATEMENT LABELS

```
LABEL  ISN  ADDR     LABEL  ISN  ADDR     LABEL  ISN  ADDR     LABEL  ISN  ADDR
  630  14  000028     1000  18  000054     1001  20  00005E      400  26  00006A
  126  46  000044
```

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EXPDCK NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IHM FLAG(I)

STATISTICS SOURCE STATEMENTS = 51, PROGRAM SIZE = 1342, SUBPROGRAM NAME = CROPG

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ******

292K BYTES OF CORE NOT USED

```
*LEVEL 2.3.0 (JUNE 78)                  OS/360  FORTRAN H EXTENDED          DATE 81.141/14.02.20      PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002              FUNCTION MOVSYM (CARD, ITEMP)                                          NUM00650
                     C                                                                          NUM00660
                     C  PURPOSE:  DECODE CARD OF FORM   SYMBOL1, SYMBOL2, ... SYMBOLN           NUM00670
                     C                                                                          NUM00680
   ISN 0003              REAL*8 ITEMP(30), IHOLD8                                               NUM00690
   ISN 0004              LOGICAL*1 ICHAR(1), IHOLD(8), IBLNK1                                   NUM00700
   ISN 0005              INTEGER*4 CARD(1)                                                      NUM00710
   ISN 0006              EQUIVALENCE (ICHAR(1), ICHAR4), (IHOLD(1),IHOLD8)                      NUM00720
                     C                                                                          NUM00730
   ISN 0007              DATA IBLNK1/' '/, ICHAR4/' '/, IBLANK/' '/, ICOMMA/','/                NUM00740
                     C                                                                          NUM00750
   ISN 0008              DO 2 I = 1,8                                                           NUM00760
   ISN 0009            2 IHOLD(I) = IBLNK1                                                      NUM00770
                     C                                                                          NUM00780
   ISN 0010              NDEX = 0                                                               NUM00790
   ISN 0011              KOUNT = 0                                                              NUM00800
                     C                                                                          NUM00810
   ISN 0012              DO 100 KOL = 11,80                                                     NUM00820
   ISN 0013              ICHAR4 = CARD(KOL)                                                     NUM00830
   ISN 0014              IF (ICHAR4 .NE. IBLANK) GO TO 10                                       NUM00840
                     C                                                                          NUM00850
                     C  BLANK                                                                   NUM00860
   ISN 0016              IF (KOL .EQ. 80 .AND. NDEX .NE. 0) GO TO 80                            NUM00870
   ISN 0018              GO TO 100                                                              NUM00880
                     C                                                                          NUM00890
                     C  NOT BLANK                                                               NUM00900
   ISN 0019           10 IF (ICHAR4 .EQ. ICOMMA) GO TO 80                                       NUM00910
                     C                                                                          NUM00920
                     C  STORE CHARACTER IN WORD DESCRIBING SYMBOL, MAX OF 4 CHARACTERS          NUM00930
   ISN 0021              NDEX = NDEX + 1                                                        NUM00940
   ISN 0022              IF (NDEX .GT. 8) GO TO 100                                             NUM00950
   ISN 0024              IHOLD(NDEX) = ICHAR(I)                                                 NUM00960
   ISN 0025              IF (KOL .EQ. 80) GO TO 80                                              NUM00970
   ISN 0027              GO TO 100                                                              NUM00980
                     C                                                                          NUM00990
                     C  END OF SYMBOL                                                           NUM01000
   ISN 0028           80 KOUNT = KOUNT + 1                                                      NUM01010
   ISN 0029              ITEMP(KOUNT) = IHOLD8                                                  NUM01020
   ISN 0030              NDEX = 0                                                               NUM01030
   ISN 0031              DO 81 II = 1,8                                                         NUM01040
   ISN 0032           81 IHOLD(II) = IBLNK1                                                     NUM01050
                     C                                                                          NUM01060
   ISN 0033          100 CONTINUE                                                               NUM01070
                     C                                                                          NUM01080
   ISN 0034              MOVSYM = KOUNT                                                         NUM01090
   ISN 0035              RETURN                                                                 NUM01100
   ISN 0036              END                                                                    NUM01110

                              *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL   INTERNAL STATEMENT NUMBERS
I        0008  0009
II       0031  0032
KOL      0012  0013  0016  0025
CARD     0002  0005  0013
NDEX     0010  0016  0021  0022  0024  0030
ICHAR    0004  0006  0024
IHOLD    0004  0006  0009  0024  0032
ITEMP    0002  0003  0029
KOUNT    0011  0028  0028  0029  0034
IBLANK   0007  0014
IBLNK1   0004  0007  0009  0032
ICHAR4   0006  0007  0013  0014  0019
ICOMMA   0007  0019
IHOLD8   0003  0006  0029
MOVSYM   0002  0034

                              *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
 LABEL    DEFINED    REFERENCES
     2      0009      0008
    10      0019      0014
    80      0028      0016  0019  0025
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
81	0032	0031
100	0033	0012 0018 0022 0027

/ MOVSYM / SIZE OF PROGRAM 000218 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I SF		I*4	000098	II SF		I*4	00009C	KOL SF		I*4	0000A0	CARD F	XR	I*4	000000
NDEX SF		I*4	0000A4	ICHAR F	E	L*1	0000C0	IHOLD S	E	L*1	0000C6	ITEMP S	XR	A*8	000000
KOUNT SF		I*4	0000A8	IBLANK		I*4	0000AC	IBLNK1 F		L*1	000094	ICHAR4 S	E	I*4	0000C0
ICOMMA		I*4	000080	IHOLD8 F	E	A*8	0000C8	MOVSYM S		I*4	000084				

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
2	9	00010A	10	19	000156	80	28	00017E	81	32	000198
100	33	0001AA									

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	0000E8	100002	10	000110	100003	13	000128	100004	16	000146
200001	17	000140	100005	18	000152	100006	21	000162	100007	24	00016A
100008	27	00017A	100010	34	000182						

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 35, PROGRAM SIZE = 536, SUBPROGRAM NAME =MOVSYM

STATISTICS NO DIAGNOSTICS GENERATED

*****END OF COMPILATION ***** 292K BYTES OF CORE NOT USED

```
*LEVEL 2.3.0 (JUNE 78)                    OS/360  FORTRAN H EXTENDED          DATE 81.141/14.02.14        PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002                FUNCTION NUMBFL (CARD,XNMVEC)                                                  NUM00010
                     C                                                                                    NUM00020
                     C  MOVES FLOATING POINT NUMBERS FROM CARD TO ARRAY XNMVEC.                           NUM00030
                     C  STORES COUNT OF NUMBERS IN NUMB                                                   NUM00040
                     C                                                                                    NUM00050
   ISN 0003          C       IMPLICIT INTEGER (A-C)                                                       NUM00060
                     C                                                                                    NUM00070
   ISN 0004          C       DIMENSION CARD(1),XNMVEC(1)                                                  NUM00080
   ISN 0005          C       DATA    BLANK/' '/,COMMA/','/                                                NUM00090
   ISN 0006          C       DATA MINUS /'-'/                                                             NUM00100
   ISN 0007          C       DATA IZERO/'0'/,NINE/'9'/, KDOT/'.'/                                         NUM00110
                     C                                                                                    NUM00120
                     C  ITRIG = SWITCH FOR NUMBER COLLECTED AND NOT STORED                                NUM00130
   ISN 0008          C       ITRIG = 0                                                                    NUM00140
   ISN 0009          C       INEG = 1                                                                     NUM00150
   ISN 0010          C       XNUM = 0.                                                                    NUM00160
   ISN 0011          C       NDEX = 0                                                                     NUM00170
   ISN 0012          C        IDEC = 0                                                                    NUM00180
                     C                                                                                    NUM00190
   ISN 0013          C       DO 66  COL=1,80                                                              NUM00200
   ISN 0014          C       IF (CARD(COL) .EQ. KDOT) GO TO 20                                            NUM00210
   ISN 0016          C       IF (CARD(COL) .EQ. MINUS) GO TO 40                                           NUM00220
   ISN 0018          C       IF (CARD(COL) .EQ. BLANK) GO TO 60                                           NUM00230
   ISN 0020          C       IF (CARD(COL) .EQ. COMMA) GO TO 50                                           NUM00240
   ISN 0022          C       IF(CARD(COL) .LT. IZERO .OR. CARD(COL) .GT. NINE) GO TO 90                   NUM00250
   ISN 0024          C       CALL I4A1BN(CARD(COL),1,NWORD)                                               NUM00260
   ISN 0025          C       ITRIG=1                                                                      NUM00270
   ISN 0026          C       IF (IDEC .EQ. 1) GO TO 10                                                    NUM00280
   ISN 0028          C       XNUM = 10 * XNUM + NWORD                                                     NUM00290
   ISN 0029          C       GO TO 60                                                                     NUM00300
                     C                                                                                    NUM00310
                     C DECIMAL FRACTION                                                                   NUM00320
   ISN 0030        10        XWORD = NWORD                                                                NUM00330
   ISN 0031          C       XNUM = XNUM + XWORD/IPOWER                                                   NUM00340
   ISN 0032          C       IPOWER = IPOWER * 10                                                         NUM00350
   ISN 0033          C       GO TO 60                                                                     NUM00360
                     C                                                                                    NUM00370
                     C  DECIMAL                                                                           NUM00380
   ISN 0034        20        IDEC = 1                                                                     NUM00390
   ISN 0035          C       IPOWER = 10                                                                  NUM00400
   ISN 0036          C       GO TO 60                                                                     NUM00410
                     C                                                                                    NUM00420
                     C  MINUS SIGN                                                                        NUM00430
   ISN 0037        40        INEG = -1                                                                    NUM00440
   ISN 0038          C       GO TO 60                                                                     NUM00450
                     C                                                                                    NUM00460
                     C  END OF NUMBER. INEG IS SET TO 1 OR -1                                             NUM00470
   ISN 0039        50        NDEX = NDEX + 1                                                              NUM00480
   ISN 0040          C       XNMVEC(NDEX) = XNUM * INEG                                                   NUM00490
   ISN 0041          C       INEG = 1                                                                     NUM00500
   ISN 0042          C       IDEC = 0                                                                     NUM00510
   ISN 0043          C       ITRIG = 0                                                                    NUM00520
   ISN 0044          C       XNUM = 0.                                                                    NUM00530
   ISN 0045        60        CONTINUE                                                                     NUM00540
   ISN 0046        66        CONTINUE                                                                     NUM00550
                     C                                                                                    NUM00560
   ISN 0047          C    90 IF(ITRIG.EQ.0)GO TO 100                                                      NUM00570
   ISN 0049          C       NDEX = NDEX + 1                                                              NUM00580
   ISN 0050          C       XNMVEC(NDEX) = XNUM * INEG                                                   NUM00590
                     C                                                                                    NUM00600
   ISN 0051        100       NUMBFL = NDEX                                                                NUM00610
   ISN 0052          C       RETURN                                                                       NUM00620
   ISN 0053          C        END                                                                         NUM00630
                                                                                                          NUM00640

                          *****F O R T R A N    C R O S S    R E F E R E N C E    L I S T I N G*****
SYMBOL   INTERNAL STATEMENT NUMBERS
COL      0013  0014  0016  0018  0020  0022  0022  0024
CARD     0002  0004  0014  0016  0018  0020  0022  0022  0024
IDEC     0012  0026  0034  0042
INEG     0009  0037  0040  0041  0050
KDOT     0007  0014
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT NUMBERS					
NDEX	0011	0039	0039	0040	0049	0050	0051
NINE	0007	0022					
XNUM	0010	0028	0028	0031	0031	0040	0044	0050
BLANK	0005	0018					
COMMA	0005	0020					
ITRIG	000A	0025	0043	0047			
IZERO	0007	0022					
MINUS	0006	0016					
NWORD	0024	0028	0030				
XWORD	0030	0031					
IPOWER	0031	0032	0032	0035			
I4A1BN	0024						
NUMBFL	0002	0051					
XNMVEC	0002	0004	0040	0050			

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES				
10	0030	0026				
20	0034	0014				
40	0037	0016				
50	0039	0020				
60	0045	0018	0029	0033	0036	0038
66	0046	0013				
90	0047	0024				
100	0051	0047				

/ NUMBFL / SIZE OF PROGRAM 00032E HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
COL	SFA	I*4	0000B4	CARD	SFA XR	I*4	000000	IDEC	S	I*4	0000B8	INEG	SF	I*4	0000BC
KNOT		I*4	0000C0	NDEX	SF	I*4	0000C4	NINE		I*4	0000C8	XNUM	SF	R*4	0000CC
BLANK		I*4	0000D0	COMMA		I*4	0000D4	ITRIG	S	I*4	0000D8	IZERO		I*4	0000DC
MINUS		I*4	0000E0	NWORD	SFA	I*4	0000E4	XWORD	SF	R*4	0000E8	IPOWER	SF	I*4	0000EC
I4A1BN	SF XF		000000	NUMBFL	S	I*4	0000F0	XNMVEC	S XR	R*4	000000				

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	30	000204	20	34	000248	40	37	000254	50	39	00025E
60	45	000292	66	46	000292	90	47	00029E	100	51	0002C8

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000114	100002	14	00014E	100003	16	000160	100004	18	000172
100005	20	000184	100006	22	000196	200001	23	0001A8	100007	24	0001BA
100008	28	0001DE	100010	49	0002A4						

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 52, PROGRAM SIZE = 814, SUBPROGRAM NAME =NUMBFL

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 292K BYTES OF CORE NOT USED

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*LEVEL 2.3.0 (JUNE 78)                    OS/360  FORTRAN H EXTENDED          DATE 81.141/14.17.41      PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002              SUBROUTINE RDEXEC                                                          RDE00010
                C                                                                                   RDE00020
   ISN 0003             IMPLICIT INTEGER (A-X)                                                     RDE00030
                C                                                                                   RDE00040
                CCCC    PURPOSE:  READ INFORMATION FROM THE EXEC FILE AND THE LARS DIRECTORY        RDE00050
                CCCC              INFORMATION WRITTEN ON FILE 7 BY THE    PROGRAM                   RDE00060
                CCCC                   SEGMENT NUMBER                                               RDE00070
                CCCC                   NUMBER OF ACQUISITONS                                        RDE00080
                CCCC                   ACQUISITION DATES                                            RDE00090
                CCCC                   SUN ANGLES                                                   RDE00100
                CCCC                   LANDSAT NUMBERS                                              RDE00110
                C                                                                                   RDE00120
                                                                                                    RDE00130
   ISN 0004             COMMON /USER/ ICROP(4),ZX(4),SUNANG(8)                                     RDE00140
   ISN 0005             REAL*4 ZX                                                                  RDE00150
   ISN 0006             COMMON /MISC/ NOACQ, ACQDT(8), KSEGM, DATE(4),LANDST(8)                    RDE00160
   ISN 0007             REAL * 8 ACQDT                                                             RDE00170
                C                                                                                   RDE00180
                C  READ SEGMENT NUMBER                                                              RDE00190
                CCCC    WRITE (3,9999)                                                              RDE00200
   ISN 0008     9999    FORMAT (' ENTERING RDEXEC')                                                 RDE00210
   ISN 0009             READ (7,1000) KSEGM                                                        RDE00220
   ISN 0010     1000    FORMAT (20A4)                                                              RDE00230
                C                                                                                   RDE00240
                CCCC    WRITE (3,9998) KSEGM                                                        RDE00250
   ISN 0011     9998    FORMAT (' KSEGM=',A4)                                                      RDE00260
                C  READ NUMBER OF ACQUISITIONS                                                      RDE00270
   ISN 0012             READ(7,400) NOACQ                                                          RDE00280
   ISN 0013     400     FORMAT (2014)                                                              RDE00290
                C                                                                                   RDE00300
                C  READ ACQUISITION DATE                                                            RDE00310
   ISN 0014             READ (7,700) (ACQDT(I),I=1,NOACQ)                                          RDE00320
                CCCC    WRITE (3,700) (ACQDT(I),I=1,NOACQ)                                         RDE00330
   ISN 0015     700     FORMAT (10(2X,A5))                                                         RDE00340
                C                                                                                   RDE00350
                C  READ SUN ANGLES                                                                  RDE00360
   ISN 0016             READ (7,400) (SUNANG(I),I=1,NOACQ)                                         RDE00370
                C                                                                                   RDE00380
                C  READ LANDSAT NUMBERS                                                             RDE00390
   ISN 0017             READ (7,400) (LANDST(I),I=1,NOACQ)                                         RDE00400
                CCCC    WRITE (3,400) (LANDST(I),I=1,NOACQ)                                        RDE00410
                C                                                                                   RDE00420
   ISN 0018             RETURN                                                                     RDE00430
   ISN 0019             END                                                                        RDE00440

                          *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL  INTERNAL STATEMENT NUMBERS
I       0014  0014  0014  0016  0016  0016  0017  0017  0017
ZX      0004  0005
DATE    0006
ACQDT   0006  0007  0014
ICROP   0004
KSEGM   0006  0009
NOACQ   0006  0012  0014  0016  0017
LANDST  0006  0017
RDEXEC  0002
SUNANG  0004  0016

                          *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
 LABEL   DEFINED   REFERENCES
   400     0013    0012  0016  0017
   700     0015    0014
  1000     0010    0009
  9998     0011
  9999     000A

                                                  /  RDEXEC /     SIZE OF PROGRAM 0001CA HEXADECIMAL BYTES

        NAME    TAG   TYPE  ADD.      NAME    TAG   TYPE  ADD.      NAME    TAG   TYPE  ADD.      NAME    TAG   TYPE  ADD.
        I  F          I*4   0000HC      ZX      C   R*4     NR      DATE    C     I*4     NR      ACQDT S C     R*8   000008
```

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 ICROP      C  I*4   NR      KSEGM S    C  I*4  000048   NOACQ SF  C  I*4  000000   18COM# F  XF  I*4  000000
 LANDST S   C  I*4  00005C   RDEXEC        I*4  0000C0   SUNANG S  C  I*4  000020
```

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * USER* SIZE OF BLOCK 000040 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
ICROP	I*4	000000 NR	ZX	R*4	000010 NR	SUNANG	I*4	000020			

NAME OF COMMON BLOCK * MISC* SIZE OF BLOCK 00007C HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NOACQ	I*4	000000	ACQDT	R*8	000008	KSEGM	I*4	00004R	DATE	I*4	00004C NR
LANDST	I*4	00005C									

COMPILER GENERATED LABELS

LABEL	ISN	ADDR
100001	2	0000DC

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
9999	8	000028 NR	1000	10	00003C	9998	11	000042 NR	400	13	00004F
700	15	000055									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 18, PROGRAM SIZE = 458, SUBPROGRAM NAME =RDEXEC

STATISTICS NO DIAGNOSTICS GENERATED

***** END OF COMPILATION ***** 296K BYTES OF CORE NOT USED

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*LEVEL 2.3.0 (JUNE 78)                    OS/360  FORTRAN H EXTENDED          DATE 81.141/14.18.02      PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

ISN 0002                SUBROUTINE RDFLES (ITYPE, HDR, VERTPX, VERTLN, IERROR)                          RDF00010
                  C     PURPOSE: MOVE DATA FROM A UNIVERSAL FORMAT TAPE TO  IDATA                       RDF00020
                  C        MOVE MULTIPLE CHANNELS OF DATA                                               RDF00030
                  CCC                                                                                   RDF00040
                  CCC      **********    INPUT    **********                                            RDF00050
                  C     DATA FILES ON UNITS 11 - 18                                                     RDF00060
                  CCC                                                                                   RDF00070
                  CCC      **********    OUTPUT   **********                                            RDF00080
                  C     ITYPE = 1  READ HEADER RECORDS AND POSITION TAPE FOR 1ST FILE                   RDF00090
                  C     ITYPE = 2  READ A LINE OF PIXELS INTO IDATA                                     RDF00100
                  CCC                 RADIANCE VALUES (196 X NUMBER OF CHANNELS)                        RDF00110
                  CCC                                                                                   RDF00120
ISN 0003                IMPLICIT INTEGER (A-Z)                                                          RDF00130
                  C                                                                                     RDF00140
ISN 0004                LOGICAL*1 HDR(1)                                                                RDF00150
ISN 0005                REAL*4 VERTPX(4), VERTLN(4)                                                     RDF00160
                  CCC                                                                                   RDF00170
                  C     IDATA HAS (72 + 4*196) CHARACTERS FOR A MAX OF 8 ACQUISITIONS                   RDF00180
ISN 0006                COMMON /LINES/ NXTLNE, LINENO, IDATA(856,8), NOACQS                             RDF00190
ISN 0007                LOGICAL*1 IDATA                                                                 RDF00200
                  CCC                                                                                   RDF00210
                  CCC   ITYPE=1, READ HEADER;  ITYPE=2, READ DATA                                       RDF00220
                                                                                                        RDF00230
                                                                                                        RDF00240
ISN 0008                IERROR = 0                                                                      RDF00250
ISN 0009          10    IF (ITYPE .EQ. 2) GO TO 100                                                     RDF00260
                  C                                                                                     RDF00270
                  C   SKIP OVER HEADER RECORDS                                                          RDF00280
ISN 0011                DO 15 I = 1,NOACQS                                                              RDF00290
ISN 0012                ITAPE = 10 + I                                                                  RDF00300
ISN 0013                REWIND ITAPE                                                                    RDF00310
ISN 0014                READ (ITAPE, 1111, END = 901) HDR                                               RDF00320
ISN 0015          1111  FORMAT (17(180A1))                                                              RDF00330
ISN 0016          15    CONTINUE                                                                        RDF00340
                  C                                                                                     RDF00350
ISN 0017                NOFLD=0                                                                         RDF00360
                  C*                                                                                    RDF00370
                  C   READ FIELD DEFINITION                                                             RDF00380
ISN 0018          20    CALL RDVFRT ( VERTPX, VERTLN, IERROR)                                           RDF00390
ISN 0019                SAMINC = 1                                                                      RDF00400
ISN 0020                LININC = 1                                                                      RDF00410
ISN 0021                WRITE (6,1600) SAMINC, LININC, (VERTPX(I),VERTLN(I),I=1,4)                      RDF00420
ISN 0022          1600  FORMAT(//, ' PIXEL SKIP FACTOR = ',I4, ' LINE SKIP FACTOR = ',I4,               RDF00430
                     1 /, ' VERTICES (PIXEL, LINE)=',5('(',F4.0,',',F4.0,')',1X)  )                     RDF00440
                  C*                                                                                    RDF00450
                  C     SET NEXT LINE NUMBER                                                            RDF00460
ISN 0023                NXTLNE = 1                                                                      RDF00470
ISN 0024                RETURN                                                                          RDF00480
                  C                                                                                     RDF00490
                  C  NO FILE                                                                            RDF00500
ISN 0025          901   IDISK = ITAPE - 10                                                              RDF00510
ISN 0026                WRITE (6,902) IDISK                                                             RDF00520
ISN 0027                WRITE (3,902) IDISK                                                             RDF00530
ISN 0028          902   FORMAT (' DISK FILE HEADER RECORD FOR FILE ',I2, ' IS MISSING.',                RDF00540
                     1 /, ' RUN WILL TERMINATE')                                                        RDF00550
ISN 0029                IERROR = 1                                                                      RDF00560
ISN 0030                RETURN                                                                          RDF00570
                  C                                                                                     RDF00580
                  CCC  READ LINES FROM RADIANCE VALUE FILES                                             RDF00590
                  C    SKIP OVER UNNEEDED LINES                                                         RDF00600
ISN 0031          100   IF (NXTLNE .EQ. LINENO) GO TO 120                                               RDF00610
                  C                                                                                     RDF00620
ISN 0033                ISKIP = LINENO - NXTLNE                                                         RDF00630
ISN 0034                DO 110 J = 1,NOACQS                                                             RDF00640
ISN 0035                ITAPE = 10 + J                                                                  RDF00650
ISN 0036                DO 110 I = 1,ISKIP                                                              RDF00660
ISN 0037                READ (ITAPE,1111, END=910) DUMMY                                                RDF00670
ISN 0038          110   CONTINUE                                                                        RDF00680
                  C                                                                                     RDF00690
ISN 0039          120   DO 130 I = 1,NOACQS                                                             RDF00700
ISN 0040                ITAPE = 10 + I                                                                  RDF00710
                  C   READ (72 + 4*196) CHARACTERS                                                      RDF00720
                                                                                                        RDF00730
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ISN 0041          READ (ITAPE,1112,END=910) (IDATA(III,I),III=1,856)                RDF00740
ISN 0042    1112  FORMAT (9(100A1))                                                 RDF00750
ISN 0043    130   CONTINUE                                                          RDF00760
                  C                                                               RDF00770
ISN 0044          NXTLNE = LINENO + 1                                               RDF00780
                  C                                                               RDF00790
ISN 0045          RETURN                                                            RDF00800
                  C                                                               RDF00810
                  C  END OF FILE WHILE TRYING TO READ GRAY LEVEL RECORD             RDF00820
ISN 0046    910   IDISK = ITAPE -10                                                 RDF00830
ISN 0047          WRITE (3,911) NXTLNE, IDISK                                       RDF00840
ISN 0048          WRITE (6,911) NXTLNE, IDISK                                       RDF00850
ISN 0049    911   FORMAT (' END OF FILE WHILE TRYING TO READ RECORD',I4,            RDF00860
                 1  ' ON DISK FILE ', I4, /, ' RUN WILL TERMINATE')                 RDF00870
ISN 0050          IERROR = 1                                                        RDF00880
ISN 0051           RETURN                                                           RDF00890
                  C                                                               RDF00900
ISN 0052          END                                                               RDF00910
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS									
I	0011	0012	0021	0021	0021	0021	0036	0039	0040	0041
J	0034	0035								
NDR	0002	0004	0014							
III	0041	0041	0041							
DUMMY	0037									
IDATA	0006	0007	0041							
IDISK	0025	0026	0027	0046	0047	0048				
ISKIP	0033	0036								
ITAPE	0012	0013	0014	0025	0035	0037	0040	0041	0046	
ITYPE	0002	0009								
NOFLD	0017									
IERROR	0002	0008	0018	0029	0050					
LINENO	0006	0031	0033	0044						
LININC	0020	0021								
NOACQS	0006	0011	0034	0039						
NXTLNE	0006	0023	0031	0033	0044	0047	0048			
RDFLES	0002									
RDVERT	0018									
SAMINC	0019	0021								
VERTLN	0002	0005	0018	0021						
VERTPX	0002	0005	0018	0021						

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES	
10	0009		
15	0016	0011	
20	0018		
100	0031	0009	
110	0038	0034	0036
*120	0039	0031	
130	0043	0039	
901	0025	0014	
902	0028	0026	0027
910	0046	0037	0041
911	0049	0047	0048
1111	0015	0014	0037
1112	0042	0041	
1600	0022	0021	

/ RDFLES / SIZE OF PROGRAM 00052A HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	0001BC	J	SF	I*4	0001C0	NDR	S XR	L*1	000000	III	F	I*4	0001C4
DUMMY	S	I*4	0001C8	IDATA	S C	L*1	000008	IDISK	SF	I*4	0001CC	ISKIP	SF	I*4	0001D0
ITAPE	SF	I*4	0001D4	ITYPE	C	I*4	0001D8	NOFLD	S	I*4	0001DC	IBCOM#	F XF	I*4	000000
IERROR	SFA	I*4	0001E0	LINENO	F C	I*4	000004	LININC	SF	I*4	0001E4	NOACQS	F C	I*4	0001AC8
NXTLNE	SF C	I*4	000000	RDFLES		I*4	0001E8	RDVERT	SF XF		000000	SAMINC	SF	I*4	0001EC
VERTLN	SFA XR	R*4	000000	VERTPX	SFA XR	R*4	000000								

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * LINES* SIZE OF BLOCK 0001ACC HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NXTLNF	I*4	000000	LINENO	I*4	000004	IDATA	L*1	000008	NOACQS	I*4	000AC8

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR		LABEL	ISN	ADDR		LABEL	ISN	ADDR		LABEL	ISN	ADDR
10	9	000248	NR	15	16	00029C		20	18	0002AE	NR	901	25	000328
100	31	000380		110	38	0003C4		120	39	0003D8		130	43	000416
910	46	00043A												

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000228	100002	11	000254	100003	12	000256	100004	14	00026C
100005	14	000280	100006	17	0002A6	100007	21	0002E2	100008	21	000310
100009	33	000380	100010	35	00039A	100011	37	0003A4	100012	37	000388
100013	39	0003CE	100015	40	0003DA	100016	41	0003E2	100017	41	0003F8
100020	44	000420									

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
1111	15	000028	1600	22	000031	902	28	000095	1112	42	0000E1
911	49	0000EA									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 51, PROGRAM SIZE = 1322, SUBPROGRAM NAME =RDFLES

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 292K BYTES OF CORE NOT USED

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*LEVEL 2.3.0 (JUNE 78)          OS/360  FORTRAN H EXTENDED          DATE 81.141/14.16.07      PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002              SUBROUTINE RDVERT (VERTPX, VERTLN, IERROR)                                  RDF00920
                     C                                                                             RDF00930
                     C  PURPOSE--READ AND DECODE A CARD DESCRIBING VERTICES OF TRAINING OR         RDF00940
                     C           TEST FIELD.  CARD CAN BE ABSENT INDICATING COMPLETE               RDF00950
                     C           FIELD OR CARD CAN BE IN THE FOLLOWING FORMAT:                     RDF00960
                     C                                                                             RDF00970
                     C                (1,1), (X1,Y1), (X2,Y2), (X3,Y3), (X4,Y4)                    RDF00980
                     C                                                                             RDF00990
                     C           WHERE X1,Y1 IS THE UPPER LEFT CORNER AND THE VERTICES             RDF01000
                     C           CONTINUE IN A CLOCKWISE DIRECTION.                                RDF01010
                     C                                                                             RDF01020
   ISN 0003              IMPLICIT INTEGER(A-Z)                                                       RDF01030
   ISN 0004              INTEGER CARD(80)                                                            RDF01040
   ISN 0005              REAL*4 VERTPX(4), VERTLN(4)                                                 RDF01050
   ISN 0006              REAL*4 XDEFLT(4), YDEFLT(4)                                                 RDF01060
   ISN 0007              DATA BLANK/' '/, COMMA/','/,  OPNPAR/'('/,  CLSPAR/')'/                     RDF01070
   ISN 0008              DATA XDEFLT /1., 196., 196., 1./                                            RDF01080
   ISN 0009              DATA YDEFLT /1., 1., 117., 117./                                            RDF01090
                     C                                                                             RDF01100
                     C  READ CARD                                                                  RDF01110
   ISN 0010              READ(2, 6, END=990) CARD                                                    RDF01120
   ISN 0011           6  FORMAT(80A1)                                                               RDF01130
                     C                                                                             RDF01140
                     C  SET PROGRAM TO NO COLUMNS READ, NO VERTICES FOUND                          RDF01150
   ISN 0012              NOCOL=0                                                                     RDF01160
   ISN 0013              NOVERT = -1                                                                 RDF01170
                     C                                                                             RDF01180
                     C  SET SWITCH TO NO PIXEL NUMBER READ                                         RDF01190
   ISN 0014              IPIXFL = 0                                                                  RDF01200
                     C                                                                             RDF01210
                     C  FIRST NON-BLANK CHARACTER MUST BE A (                                      RDF01220
   ISN 0015           1  ICHAR=NXTCHR(CARD,NOCOL)                                                  RDF01230
   ISN 0016              IF(ICHAR.EQ.BLANK) GO TO 935                                                RDF01240
   ISN 0018              IF(ICHAR.NE.OPNPAR) GO TO 903                                               RDF01250
                     C                                                                             RDF01260
   ISN 0020           3  NUM=0                                                                      RDF01270
   ISN 0021           4    ICHAR = NXTCHR(CARD,NOCOL)                                              RDF01280
   ISN 0022              IF(ICHAR.EQ.BLANK) GO TO 935                                                RDF01290
                     C                                                                             RDF01300
                     C  CHECK FOR COMMA SEPARATING PIXEL, LINE                                     RDF01310
   ISN 0024              IF (ICHAR .EQ. COMMA) GO TO 7                                               RDF01320
                     C                                                                             RDF01330
                     C  CHECK FOR RIGHT PARENTHESIS FINISHING PIXEL,LINE COMPLET                   RDF01340
   ISN 0026              IF(CARD(NOCOL).EQ.CLSPAR, GO TO 8                                           RDF01350
                     C                                                                             RDF01360
                     C  CHARACTER MUST BE NUMERIC                                                  RDF01370
   ISN 0028              CALL I4AIAN(ICHAR,1,NUMCHR)                                                 RDF01380
   ISN 0029              IF((NUMCHR.LT.0).OR.(NUMCHR.GT.9)) GO TO 903                                RDF01390
                     C                                                                             RDF01400
                     C  NUMERIC CHARACTER, CONVERT TO COMPUTATIONAL NUMBER AND INCLUDE IN SUM      RDF01410
   ISN 0031              NUM=10*NUM+NUMCHR                                                           RDF01420
   ISN 0032              GO TO 4                                                                     RDF01430
                     C                                                                             RDF01440
                     C  VERTEX PIXEL NUMBER                                                        RDF01450
   ISN 0033           7  NOVERT = NOVERT + 1                                                       RDF01460
   ISN 0034              IF (NOVERT .GT. 4) GO TO 910                                                RDF01470
   ISN 0036              IF (IPIXFL .NE. 0 ) GO TO 903                                               RDF01480
   ISN 0038              IF (NUM .EQ. 0) GO TO 903                                                   RDF01490
   ISN 0040              IF (NOVERT .GT. 0) VERTPX(NOVERT) = NUM                                     RDF01500
   ISN 0042              IPIXEL = NUM                                                                RDF01510
   ISN 0043              GO TO 3                                                                     RDF01520
                     C                                                                             RDF01530
                     C  VERTEX LINE NUMBER                                                         RDF01540
   ISN 0044           8  IF (IPIXFL .EQ. 0) GO TO 903                                              RDF01550
   ISN 0046              IF (NUM .EQ. 0) GO TO 903                                                   RDF01560
   ISN 0048              IF (NOVERT .GT. 0) VERTLN(NOVERT) = NUM                                     RDF01570
                     C                                                                             RDF01580
                     C  CHECK FOR COMMA FOLLOWING (PIXEL,LINE)                                     RDF01590
   ISN 0050           10 ICHAR=NXTCHR(CARD,NOCOL)                                                  RDF01600
   ISN 0051              IF(ICHAR.EQ.BLANK) GO TO 930                                                RDF01610
   ISN 0053              IF(ICHAR.EQ.COMMA) GO TO 2                                                  RDF01620
                     C                                                                             RDF01630
                     C                                                                             RDF01640
```

```
               C  SOMETHING WRONG WITH ORDER OF CHARACTERS                            RDF01650
 ISN 0055        903 WRITE(6,904) CARD                                                RDF01660
 ISN 0056            WRITE (3,904) CARD                                               RDF01670
 ISN 0057      904   FORMAT(' ERROR IN VERTICES CARD',/,1X,80A1,/,' RUN WILL TERMINATE RDF01680
                    1  ')                                                             RDF01690
 ISN 0058            IERROR = 1                                                       RDF01700
 ISN 0059            RETURN                                                           RDF01710
               C                                                                      RDF01720
               C  TOO MANY VERTICES                                                   RDF01730
 ISN 0060      910   WRITE (3,911) CARD                                               RDF01740
 ISN 0061            WRITE (6,911) CARD                                               RDF01750
 ISN 0062      911   FORMAT (' MAXIMUM OF 4 VERTICES ALLOWED',/,1X,80A1,/,' RUN WILL TERDF01760
                    1RMINATE')                                                        RDF01770
 ISN 0063            IERROR [illegible]                                               RDF01780
 ISN 0064            RETURN                                                           RDF01790
               C                                                                      RDF01800
               C  END OF CARD                                                         RDF01810
 ISN 0065      930   IF (NOVERT .EQ. 4) RETURN                                        RDF01820
               C                                                                      RDF01830
               C  ERROR, CARD TERMINATES BEFORE 4TH VERTICES FINISHED                 RDF01840
 ISN 0067      935   WRITE (6,936) CARD                                               RDF01850
 ISN 0068            WRITE (3,936) CARD                                               RDF01860
 ISN 0069      936   FORMAT (' END OF CARD BEFORE END OF 4TH SET OF VERTICES'/,1X,80A1,RDF01870
                    1 /,  ' RUN WILL TERMINATE')                                      RDF01880
 ISN 0070            IERROR = 1                                                       RDF01890
 ISN 0071            RETURN                                                           RDF01900
               C                                                                      RDF01910
               C  NO FIELD DEFINITION CARD, DEFAULT TO WHOLE SCENE                    RDF01920
 ISN 0072      990   DO 995 I = 1,4                                                   RDF01930
 ISN 0073            VERTPX(I) = XDEFLT(I)                                            RDF01940
 ISN 0074            VERTLN(I) = YDEFLT(I)                                            RDF01950
 ISN 0075      995   CONTINUE                                                         RDF01960
 ISN 0076            RETURN                                                           RDF01970
               C                                                                      RDF01980
 ISN 0077            END                                                              RDF01990
```

*****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS										
I	0072	0073	0073	0074	0074						
NUM	0020	0031	0031	0038	0040	0042	0046	0048			
CARD	0004	[illegible]	0015	0021	0026	0050	0055	0056	0060	0061	0067	0068
BLANK	0007	00[illegible]6	0022	0051							
COMMA	0007	[illegible]	0053								
ICHAR	0015	[illegible]	0018	0021	0022	0024	0028	0050	0051	0053	
NOCOL	0012	[illegible]	0021	0026	0050						
CLSPAR	0007	0026									
IERROR	0002	0058	0063	0070							
IPIXEL	0014	0036	0042	0044							
I4A1BN	0028										
NOVERT	0013	0033	0033	0034	0040	0040	0048	0048	0065		
NUMCHR	0028	0029	0029	0031							
NXTCHR	0015	0021	0050								
OPNPAR	0007	0018									
RDVERT	0002										
VERTLN	0002	0005	0048	0074							
VERTPX	0002	0005	0040	0073							
XDEFLT	0006	0008	0073								
YDEFLT	0006	0009	0074								

*****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****

LABEL	DEFINED	REFERENCES					
2	0014	0053					
3	0020	0043					
4	0021	0032					
6	0011	0010					
7	0033	0024					
8	0044	0026					
10	0050						
11	0015						
903	0055	0018	0029	0036	0038	0044	0046
904	0057	0055	0056				
910	0060	0034					
911	0062	0060	0061				
930	0065	0051					
935	0067	0016	0022				
936	0069	0067	0068				

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*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
990	0072	0010
995	0075	0072

/ RDVERT / SIZE OF PROGRAM 0000CA HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	000184	NUM	SF	I*4	000188	CARD	SFA	I*4	000B8	BLANK		I*4	000180
COMMA		I*4	000190	ICHAR	SFA	I*4	000194	NOCOL	SFA	I*4	000198	CLSPAR		I*4	000190
IBCOM#	F XF	R*4	000000	IERRON	S	I*4	0001A0	IPIXFL	S	I*4	0001A4	[illegible]	SF XF		[illegible]
NOVERT	SF	I*4	0001A8	NUMCHR	SFA	I*4	0001AC	NXTCHR	F XF	I*4	000000	OPNPAR		I*4	000180
RDVERT		I*4	000184	VERTLN	S XR	R*4	000000	VERTPX	S XR	R*4	000000	XDEFLT	F	R*4	0002F8
YDEFLT	F	R*4	000308												

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR		LABEL	ISN	ADDR	LABEL	ISN	ADDR
2	14	00038E	11	15	000390	NR	3	20	0003AE	4	21	0003B0
7	33	000424	8	44	000466		10	50	000498	903	55	0004A6
910	60	0005IC	930	65	000580		935	67	0005A6	990	72	00060C
995	75	000640										

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000340	100002	10	000374	100003	18	0003A6	100004	24	0003C6
100005	26	0003CE	100006	28	0003E2	100007	31	000414	100008	36	00042E
100009	38	000434	100010	40	00043A	100011	41	000440	100012	42	000460
100013	46	00046C	100014	48	000472	100015	49	000478	100016	53	0004AE
100017	66	000586	100018	73	000610	100019	76	00064A			

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
6	11	000028	904	57	00002E	911	62	000069	936	69	0000A8

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 76, PROGRAM SIZE = 1738, SUBPROGRAM NAME =RDVERT

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 284K BYTES OF CORE NOT USED

STATISTICS NO DIAGNOSTICS THIS STEP

```
*LEVEL 2.3.0 (JUNE 78)                    OS/360  FORTRAN H EXTENDED          DATE 81.141/14.19.35      PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002                SUBROUTINE RECT (P,Q,XX,XY,ICOR)                                        REC00016
                     C  PURPOSE:  DETERMINE IF POINT IS IN TRAINING FIELD                          REC00020
   ISN 0003                DIMENSION XX(4),XY(4),THETA(4),AM(4),AX(4),AY(4)                        REC00030
   ISN 0004                ICOR=1                                                                  REC00040
   ISN 0005                NN = 4                                                                  REC00050
                     C  CHECK IF POINT IF ONE OF BOUNDRY POINTS                                    REC00060
   ISN 0006                DO 4 M = 1,NN                                                           REC00070
   ISN 0007                IF (P.EQ.XX(M) .AND. Q.EQ.XY(M))  GO TO 5                               REC00080
   ISN 0009           4     CONTINUE                                                               REC00090
   ISN 0010                GO TO 6                                                                 REC00100
                     C  POINT IN BOUNDS                                                            REC00110
   ISN 0011           5    ICOR = 0                                                               REC00120
   ISN 0012                RETURN                                                                  REC00130
                     C  CHECK FOR POINT INSIDE OF BOUNDS                                           REC00140
   ISN 0013           6    DO 1 I = 1,NN                                                          REC00150
   ISN 0014                AX(I) = P - XX(I)                                                       REC00160
   ISN 0015                AY(I) = Q - XY(I)                                                       REC00170
   ISN 0016                XM=AX(I)*AX(I)+AY(I)*AY(I)                                              REC00180
   ISN 0017           1     AM(I) = SQRT(XM)                                                       REC00190
                     C                                                                             REC00200
   ISN 0018                DO 2 J=1,NN                                                             REC00210
   ISN 0019                K=J+1                                                                   REC00220
   ISN 0020                IF (K.GT.NN) K=1                                                        REC00230
   ISN 0022                XTH=(AX(J)*AX(K)+AY(K)*AY(J))/(AM(J)*AM(K))                             REC00240
   ISN 0023           2     THETA(J) = ACOS(XTH)                                                   REC00250
   ISN 0024                SUM = 0.                                                                REC00260
   ISN 0025                DO 3 L = 1,NN                                                           REC00270
   ISN 0026           3     SUM = SUM+THETA(L)                                                     REC00280
   ISN 0027                DIFF = SUM - 3.14159263*2.                                              REC00290
   ISN 0028                DIFF=ABS(DIFF)                                                          REC00300
   ISN 0029                IF (DIFF.LE.1.E-04) ICOR = 0                                            REC00310
   ISN 0031                RETURN                                                                  REC00320
   ISN 0032                END                                                                     REC00330

                          *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL   INTERNAL STATEMENT NUMBERS
I        0013  0014  0014  0015  0015  0016  0016  0016  0016  0017
J        0018  0019  0022  0022  0022  0023
K        0019  0020  0020  0022  0022  0022
L        0025  0026
M        0006  0007  0007
P        0002  0007  0014
Q        0002  0007  0015
AM       0003  0017  0022  0022
AX       0003  0014  0016  0016  0022  0022
AY       0003  0015  0016  0016  0022  0022
NN       0005  0006  0013  0018  0020  0025
XM       0016  0017
XX       0002  0003  0007  0014
XY       0002  0003  0007  0015
ABS      0028
SUM      0024  0026  0026  0027
XTH      0022  0023
ACOS     0021
DIFF     0027  0028  0028  0029
ICOR     0002  0004  0011  0029
RECT     0002
SQRT     0017
THETA    0003  0023  0026

                          *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
 LABEL    DEFINED    REFERENCES
     1      0017      0013
     2      0023      0018
     3      0026      0025
     4      0009      0006
     5      0011      0007
     6      0013      0010

                                  /    RECT /    SIZE OF PROGRAM 000396 HEXADECIMAL BYTES
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NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	0000A4	J	SF	I*4	0000A8	K	SF	I*4	0000AC	L	SF	I*4	0000B0
M	SF	I*4	0000B4	P	F	R*4	0000B8	Q	F	R*4	0000BC	AM	SF	R*4	0000C0
AX	SF	R*4	0000EC	AY	SF	R*4	0000FC	NN	SF	I*4	000[illegible]0	XM	SFA	R*4	0000C4
XX	F XR	R*4	000000	XY	F XR	R*4	000000	SUM	SF	R*4	0006C8	XTH	SFA	R*4	0000CC
ACOS	F XF	R*4	000000	DIFF	SFA	R*4	0000D0	IC0R	S	I*4	0000D4	RECT		R*4	0000D8
SQRT	F XF	R*4	000000	THETA	SF	R*4	00010C								

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
4	9	000194	5	11	0001A0	6	13	0001C8	1	17	000230
2	21	00029E	3	26	0002C4						

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
000001	2	000140	000002	7	000168	000001	8	00017E	000003	10	00019C
000004	14	0001CA	000005	18	00024C	000006	19	000248	000007	21	000258
000008	22	00025A	000009	24	000288	000010	27	0002DE	000011	30	0002FA
000012	31	0002FE									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 31, PROGRAM SIZE = 918, SUBPROGRAM NAME = RECT

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 296K BYTES OF CORE NOT USED

```
*LEVEL 2.3.0 (JUNE 78)                    OS/360  FORTRAN H EXTENDED          DATE 81.141/14.21.07       PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002                SUBROUTINE SDEV(X,N,XB,S)                                          SDF00010
                  C  CALCULATES THE MEAN AND STANDARD DEVIATION OF A VECTOR                   SDF00020
                  CC                                                                          SDF00030
   ISN 0003               REAL*8 SS                                                          SDF00040
                  C  X        VECTOR                                                         SDF00050
                  C  N        NO. OF DATA POINTS                                             SDEA0060
                  C  XB       MEAN                                                           SDF00070
                  C  S        STANDARD DEVIATION                                             SDF00080
   ISN 0004               DIMENSION  X(1)                                                    SDF00090
   ISN 0005               XB=0.                                                              SDF00100
   ISN 0006               XN=N                                                               SDF00110
                  CCCC  WRITE (6,9999) (X(II),II=1,N)                                         SDF00120
                  CCCC 9999  FORMAT (' SDEV=',8F8.2,/,(       ',8F8.2))                       SDF00130
   ISN 0007               DO 1 I=1,N                                                         SDF00140
   ISN 0008     1         XB=XB+X(I)                                                         SDF00150
   ISN 0009               XB=XB/XN                                                           SDF00160
   ISN 0010               SS=0.                                                              SDF00170
   ISN 0011               DO 2 I=1,N                                                         SDF00180
   ISN 0012               XDIFF = X(I) - XB                                                  SDF00190
   ISN 0013     2          SS = SS + XDIFF * XDIFF                                           SDE00200
   ISN 0014                XN=XN-1                                                           SDF00210
   ISN 0015               XX = SS/XN                                                         SDF00220
   ISN 0016                 S=SQRT(XX)                                                       SDF00230
   ISN 0017                 RETURN                                                           SDF00240
   ISN 0018                 END                                                              SDF00250

                          *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL   INTERNAL STATEMENT NUMBERS
I        0007  0008  0011  0012
N        0002  0006  0007  0011
S        0002  0016
X        0002  0004  0008  0012
SS       0003  0010  0013  0013  0015
XB       0002  0005  0008  000A  0009  0009  0012
XN       0006  0009  0014  0014  0015
XX       0015  0016
SDEV     0002
SQRT     0016
XDIFF    0012  0013  0013

                          *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
 LABEL   DEFINED   REFERENCES
     1      000A      0007
     2      0013      0011

                                                    /   SDEV /     SIZE OF PROGRAM 000206 HEXADECIMAL BYTES

      NAME      TAG   TYPE  ADD.      NAME      TAG   TYPE  ADD.      NAME      TAG   TYPE  ADD.      NAME      TAG   TYPE  ADD.
         I  SF         I*4   0000A4       N   F      I*4   0000A8       S  S       R*4   0000AC       X   F  XR  R*4   000000
        SS  SF         R*8   0000CA      XB  SF      R*4   0000B0      XN  SF       R*4   0000B4      XX  SFA     R*4   0000B8
      SDEV             R*4   0000HC    SQRT   F  XF  R*4   000000    XDIFF  SF       R*4   0000C0

  SOURCE STATEMENT LABELS

    LABEL  ISN    ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
        1    A  000114              2   13  000152

  COMPILER GENERATED LABELS

    LABEL  ISN    ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
   100001    7  0000E4         100002    9  00012E         100003   12  000140         100004   14  00016A

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I
*STATISTICS*     SOURCE STATEMENTS =      17, PROGRAM SIZE =      518, SUBPROGRAM NAME =  SDEV
*STATISTICS*  NO DIAGNOSTICS GENERATED
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****** END OF COMPILATION ****** 296K BYTES OF CORE NOT USED

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*LEVEL 2.3.0 (APR  78)                OS/360  FORTRAN H EXTENDED          DATE 81.139/13.30.32       PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002            SUBROUTINE TRJXM (X, Y, SIGMAY, NPTS, NTERMS, MODF, ESTIM, DELTAA,TR.J00010
                      1  SIGMAA, FLAMDA, YFIT, CHISQR, IND, WEIGHT, IPRINT)                TR.J00020
                     C                                                                       TR.J00030
                     C  PURPOSE:                                                             TR.J00040
                     C    MAKE A LEAST-SQUARE FIT TO NON-LINEAR FUNCTION FZNCTN              TR.J00050
                     C    AND ESTIMATE THE NON-LINEAR PARAMETER ESTIM                        TR.J00060
                     C                                                                       TR.J00070
                     C  REFERENCE:                                                           TR.J00080
                     C    D. W. MARQUARDT (1963) AN ALGORITHM FOR LEAST-SQUARES              TR.J00090
                     C    ESTIMATION OF NONLINEAR PARAMETERS, J. SOC. INDUST. APPLI. MATH.,  TR.J00100
                     C    11, P 431-441)                                                     TR.J00110
                     C                                                                       TR.J00120
                     C  INPUT:                                                               TR.J00130
                     C    X - TIME ARRAY AS DAYS OF YEAR / 100.                              TR.J00140
                     C    Y - ARRAY OF MEANS OF GREENNESS VALUES FOR TRAIN FLD (1 PER ACQ)   TR.J00150
                     C    SIGMAY - ARRAY OF CORRESPONDING ST. DEVS.                          TR.J00160
                     C    NPTS - NUMBER OF ACQUISITIONS                                      TR.J00170
                     C    NTERMS - 4                                                         TR.J00180
                     C    MODF - 1  (NOT USED, FORMERLY USED FOR WEIGHTING FACTOR)           TR.J00190
                     C    ESTIM - INITIAL GUESSES (CHANGED BY TRJXM)                         TR.J00200
                     C    FLAMDA -                                                           TR.J00210
                     C    WEIGHT -  ARRAY OF WEIGHTING VALUES CALC'D AS 1. / (SIGMAY**2)     TR.J00220
                     C    IPRINT -  USED IN DEBUG TO TURN PRINT STATEMENTS OFF AND ON        TR.J00230
                     C                                                                       TR.J00240
                     C  OUTPUT                                                               TR.J00250
                     C    ESTIM - ESTIMATED VALUES FITTING MODEL TO INPUT ARRAYS X, Y, SIGMAYTR.J00260
                     C    DELTAA - 1.E-5 ARRAY USED FOR NON-ANALYSTICAL FUNCTIONS            TR.J00270
                     C    SIGMAA - ARRAY OF ERROR ON APPROXIMATIONS ESTIM                    TR.J00280
                     C    FLAMDA -                                                           TR.J00290
                     C    YFIT -                                                             TR.J00300
                     C    CHISQR - CHI-SQUARE VALUE                                          TR.J00310
                     C                                                                       TR.J00320
   ISN 0003            REAL*8 ARRAY                                                        TR.J00330
   ISN 0004            REAL*8 WAIT, WEIGHT(8)                                              TR.J00340
                     C                                                                       TR.J00350
   ISN 0005            DIMENSION X(  (1),SIGMAY(1),ESTIM(1),DELTAA(1),SIGMAA(1),YFIT(1)    TR.J00360
   ISN 0006            DIMENSION ALP  ,10),BETA(10),DERIV(10),ARRAY(10,10),H(10)           TR.J00370
                     C                                                                       TR.J00380
                     C  CALC NUMBER OF DEGREES OF FREEDOM                                    TR.J00390
   ISN 0007            NDEF=NPTS-NTERMS                                                    TR.J00400
                     C                                                                       TR.J00410
                     C                                                                       TR.J00420
                     C  SET DELTAA TO VERY SMALL NUMBER                                      TR.J00430
   ISN 0008            DO 10 I = 1,NTERMS                                                  TR.J00440
   ISN 0009       10     DELTAA(I) = 1.E-4                                                  TR.J00450
                     C                                                                       TR.J00460
                     C  ZERO BETA AND ALPHA                                                  TR.J00470
   ISN 0010       31     DO 34 I=1,NTERMS                                                   TR.J00480
   ISN 0011            BETA(J)=0.                                                          TR.J00490
   ISN 0012            DO 34 K=1,J                                                         TR.J00500
   ISN 0013       34     ALPHA(J,K)=0.                                                      TR.J00510
                     C                                                                       TR.J00520
                     C  CALC ALPHA AND BETA FOR EACH ACQUISITION                             TR.J00530
   ISN 0014       41     DO 50 I=1,NPTS                                                     TR.J00540
                     C                                                                       TR.J00550
                     C                                                                       TR.J00560
                     CCCC    **** WARNING:  FERIV TO BE SUBSTITUTED FOR FZERVG               TR.J00570
   ISN 0015            CALL FZERVG(X,I,ESTIM,IND,DELTAA,NTERMS,DERIV,Y,SIGMAY,NPTS,WEIGHTTR.J00580
                      * )                                                                  TR.J00590
                     CCCC     CALL FERIV (X,Y,SIGMAY,I,ESTIM,DELTAA,NTERMS,DERIV,NPTS,WEIGHT)TR.J00600
                     C                                                                       TR.J00610
                     C  CALC. CHI SQ AS FUNCTION OF ESTIM                                    TR.J00620
                     C  ****  WARNING:  FNCTN TO BE SUBSTITUTED FOR FZNCTG                   TR.J00630
   ISN 0016       62     YFIT(I)=FZNCTG(X,I,ESTIM,IND)                                      TR.J00640
                     CCCC 62 YFIT(I) = FNCTN (X, Y, SIGMAY, I, ESTIM, NPTS, WEIGHT)        TR.J00650
                     C                                                                       TR.J00660
   ISN 0017            YXXX = Y(I) - YFIT(I)                                               TR.J00670
                     C                                                                       TR.J00680
   ISN 0018            IF (IPRINT .LT. 0.  .AND. I.EQ.1) WRITE (6,9998) I, ESTIM(I)        TR.J00690
   ISN 0019       9998 FORMAT (' I=',I2,' ESTIM(I)=',F12.6)                                  TR.J00700
                     C                                                                       TR.J00710
   ISN 0021            DO 46 I=1,NTERMS                                                    TR.J00720
   ISN 0022            WAIT = WEIGHT(I)                                                    TR.J00730
```

```
ISN 0023              BETA(J)=BETA(J) + WAIT * YXXX * DERIV(J)                  TR J00740
ISN 0024              DO 46 K=1,J                                               TR J00750
ISN 0025            WAIT = WEIGHT(I)                                            TR J00760
ISN 0026      46      ALPHA(J,K)=ALPHA(J,K) + WAIT * DERIV(J) * DERIV(K)        TR J00770
ISN 0027      50      CONTINUE                                                  TR J00780
                      C                                                         TR J00790
ISN 0028      51      DO 53 J=1,NTERMS                                          TR J00800
ISN 0029              DO 53 K=1,J                                               TR J00810
ISN 0030      53      ALPHA(K,J)=ALPHA(J,K)                                     TR J00820
                      C                                                         TR J00830
ISN 0031      61      CHISQ1=FCHISQ (Y,SIGMAY,NPTS,NFREE,MODE,YFIT,WEIGHT)      TR J00840
                      C                                                         TR J00850
ISN 0032      71      DO 74 I=1,NTERMS                                          TR J00860
ISN 0033            ALPHJJ = ALPHA(J,J)                                         TR J00870
ISN 0034              DO 73 K=1,NTERMS                                          TR J00880
ISN 0035              ZR=ALPHJJ*ALPHA(K,K)                                      TR J00890
ISN 0036              IF(ZR.LE.0.0) ZR=1.E-25                                   TR J00900
ISN 0038              ZRAY=SQRT(ZR)                                             TR J00910
ISN 0039              IF(ZRAY.LE.1.E-25) ZRAY=1.E-25                            TR J00920
ISN 0041      73      ARRAY(J,K)=ALPHA(J,K)/ZRAY                                TR J00930
ISN 0042      74      ARRAY(J,J)=1.+FLAMDA                                      TR J00940
                      C                                                         TR J00950
ISN 0043      80      CALL MTINV1(ARRAY,NTERMS,DET)                             TR J00960
                      C                                                         TR J00970
ISN 0044      81      DO 84 J=1,NTERMS                                          TR J00980
ISN 0045            ALPHJJ = ALPHA(J,J)                                         TR J00990
ISN 0046              B(J)= ESTIM(J)                                            TR J01000
ISN 0047              DO 84 K=1,NTERMS                                          TR J01010
ISN 0048              ZR=ALPHJJ*ALPHA(K,K)                                      TR J01020
ISN 0049              IF(ZR.LE.0.0) ZR=1.E-25                                   TR J01030
ISN 0051              ZRAY=SQRT(ZR)                                             TR J01040
ISN 0052      84      B(J)=B(J)+BETA(K)*ARRAY(J,K)/ZRAY                         TR J01050
                      C                                                         TR J01060
                      C  CALC CHI SQ AS FUNCTION OF CALC. VALUE B               TR J01070
ISN 0053      91      DO 92 I=1,NPTS                                            TR J01080
                      CCCC   ****  WARNING:  FNCTN SUBSTITUTE FOR F2NCTG        TR J01090
ISN 0054      92      YFIT(I)=F2NCTG(X,I,B,IND)                                 TR J01100
                      CCCC 92YFIT(I) = FNCTN(X, Y, SIGMAY, I, ESTIM, NPTS, WEIGHT)  TR J01110
                      C                                                         TR J01120
ISN 0055      93      CHISQR=FCHISQ(Y,SIGMAY,NPTS,NFREE,MODE,YFIT,WEIGHT)       TR J01130
ISN 0056              IF(CHISQ1-CHISQR)95,101,101                               TR J01140
ISN 0057      95      FLAMDA=10.*FLAMDA                                         TR J01150
ISN 0058              GO TO 71                                                  TR J01160
                      C                                                         TR J01170
ISN 0059      101     DO 103 J=1,NTERMS                                         TR J01180
ISN 0060              ESTIM(J)=B(J)                                             TR J01190
ISN 0061              ZR=ARRAY(J,J)/ALPHA(J,J)                                  TR J01200
ISN 0062              IF(ZR.LE.0.) ZR=1.E-25                                    TR J01210
ISN 0064      103     SIGMAA(J)=SQRT(ZR)                                        TR J01220
                      C                                                         TR J01230
ISN 0065              FLAMDA=FLAMDA * .1                                        TR J01240
ISN 0066      110     RETURN                                                    TR J01250
ISN 0067              END                                                       TR J01260
```

*******F O R T R A N C R O S S R E F E R E N C E L I S T I N G*******

SYMBOL	INTERNAL STATEMENT NUMBERS																		
B	0006	0046	0052	0052	0054	0060													
I	0008	0009	0014	0015	0016	0016	0017	0017	0018	0018	0022	0025	0053	0054	0054				
J	0010	0011	0012	0013	0021	0023	0023	0023	0024	0026	0026	0026	0028	0029	0030	0030	0032	0033	0033
	0041	0041	0042	0042	0044	0045	0045	0046	0046	0052	0052	0052	0059	0060	0060	0061	0061	0061	0061
	0064																		
K	0012	0013	0024	0026	0026	0026	0028	0030	0030	0034	0035	0035	0041	0041	0047	0048	0048	0052	0052
X	0002	0005	0015	0016	0054														
Y	0002	0005	0015	0017	0031	0055													
ZR	0035	0036	0036	0038	0048	0049	0049	0051	0061	0062	0062	0064							
DET	0043																		
IND	0002	0015	0016	0054															
BETA	0006	0011	0023	0023	0052														
MODE	0002	0031	0055																
NPTS	0002	0007	0014	0015	0031	0053	0055												
SQRT	0038	0051	0064																
WAIT	0004	0022	0023	0025	0026														
YFIT	0002	0005	0016	0017	0031	0054	0055												
YXXX	0017	0021																	
ZRAY	0038	0039	0039	0041	0051	0052													
ALPHA	0006	0011	0026	0026	0030	0030	0033	0035	0041	0045	0044	0061							
ARRAY	0003	0006	0041	0042	0041	0052	0051												

••••••F O R T R A N C R O S S R E F E R E N C E L I S T I N G••••••

SYMBOL	INTERNAL STATEMENT NUMBERS												
DERIV	0004	0011	0021	0026	0026								
FSTIM	0002	0005	0015	0016	001R	0046	0060						
NFREE	0007	0031	0055										
TRJXM	0002												
ALPHJJ	0033	0035	0045	004R									
CHISQR	0002	0056	0056										
CHISQ1	0031	0056											
DELTAA	0002	0005	0009	0015									
FCHISQ	0031	0055											
FLAMDA	0002	0047	0057	0057	0065	0065							
F2ERVG	0015												
F2NCTG	0016	0054											
IPRINT	0002	0018											
NTINV1	0043												
NTERMS	0002	0007	0009	0010	0015	0021	0028	0032	0034	0043	0044	0047	0059
SIGMAA	0002	0005	0064										
SIGMAY	0002	0005	0015	0031	0055								
WEIGHT	0002	0004	0015	0022	0025	0031	0055						

••••••F O R T R A N C R O S S R E F E R E N C E L I S T I N G••••••

LABEL	DEFINED	REFERENCES	
10	0009	0009	
31	0010		
34	0013	0010	0012
41	0014		
46	0026	0021	0024
50	0027	0014	
51	0028		
53	0030	002R	0029
62	0016		
63	0031		
71	0032	005R	
73	0041	0034	
74	0042	0032	
80	0043		
81	0044		
84	0052	0044	0047
91	0053		
92	0054	0053	
93	0055		
95	0057	0054	
101	0059	0056	0056
103	0064	0059	
110	0066		
999R	0020	001R	

/ TRJXM / SIZE OF PROGRAM 0000D3C HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
P	SFA	R*4	000198	I	SFA	I*4	000144	J	SF	I*4	000148	K	SF	I*4	00014C
X	SFA XR	R*4	000000	Y	SFA XR	R*4	000000	ZR	SFA	R*4	000150	DET	SFA	R*4	000154
IND	SFA	I*4	000158	BETA	SF	R*R	000100	NODE	FA	I*4	00015C	NPTS	SFA	I*4	000160
SORT	F	R*4	000000	WAIT	SF	R*R	000190	YFIT	SFA XR	R*4	000000	YXXX	SF	R*4	000164
ZMZY	SF	R*4	000164	ALPHA	SF	R*4	000168	AVRAY	SFA	R*R	000180	DERIV	SFA	R*4	000178
FSTIM	SFA XR	R*4	000000	NFREE	SFA	I*4	00016C	TRJXM		R*4	000170	ALPHJJ	SF	R*4	000174
CHISQR	S	R*4	000178	CHISQ1	S	R*4	00017C	DELTAA	SFA XR	R*4	000000	FCHISQ	F XF	R*4	000000
FLAMDA	SF	R*4	000140	F2ERVG	SF XF		000000	F2NCTG	F XF	R*4	000000	IRCOMM	F XF	I*4	000000
IPRINT		I*4	000184	NTINV1	SF XF		000000	NTERMS	SFA	I*4	000188	SIGMAA	S XR	R*4	000000
SIGMAY	SFA XR	R*4	000000	WEIGHT	SFA XR	R*R	000000								

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR		LABEL	ISN	ADDR		LABEL	ISN	ADDR		LABEL	ISN	ADDR
10	9	000748		41	14	000786		34	13	000780		41	14	0007A6
62	16	000744	XR	46	26	000BFA		50	27	000BF0		51	29	000BF2
53	30	000AFA		63	31	000924		71	32	000916		73	41	000494
74	42	000AC8		80	43	000BF4		81	44	000AFE	XR	84	52	000A62
91	53	000A8E		92	54	000AC2		93	55	000AFF		95	57	000408
101	59	000818		103	64	000454		110	66	000A9A	XR			

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10000	2	000720	10003	11	000770	10004	14	00079C	10006	15	0007AA
20000	19	000804	10007	19	00080C	10008	21	000834	10009	22	000836
10010	25	000878	10011	27	000806	10014	29	0008F4	10015	31	0009IE
10017	33	000938	10018	35	00094E	10019	37	00096C	10020	38	000974
10021	40	000980	10024	45	000A00	10025	48	000A2E	10026	50	000A4C
10027	51	000A54	10028	53	000AH4	10031	60	000B1A	10032	63	000B62

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
9998	28	000828									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 66, PROGRAM SIZE = 3388, SUBPROGRAM NAME = TRJXM

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ******

272K BYTES OF CORE NOT USED

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*LEVEL 2.3.0 (JAN 78)                    OS/360  FORTRAN H EXTENDED          DATE 81.139/13.23.43       PAGE   1

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) ;INCORE(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EXPDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002                SUBROUTINE F2ERVG (X,I,ESTIM,IND,DELTAA,NTERMS,DERIV,Y,SIGMAY,    F2N00210
                         1 NPTS, WEIGHT)                                                     F2N00220
                     C                                                                       F2N00230
   ISN 0003                REAL*8 WAIT, WEIGHT(4)                                          F2N00240
                     C                                                                       F2N00250
   ISN 0004                DIMENSION X(1), ESTIM(1), DELTAA(1), DERIV(1), Y(1), SIGMAY(1)  F2N00260
                     C                                                                       F2N00270
   ISN 0005                ESTIM(1)=ABS(ESTIM(1))                                          F2N00280
                     C                                                                       F2N00290
   ISN 0006                ESTIM(4)=ABS(ESTIM(4))                                          F2N00300
   ISN 0007                XI=X(I)/ESTIM(4)                                                F2N00310
   ISN 0008                IF(XI.LE.1.) GO TO 1                                            F2N00320
                     C                                                                       F2N00330
                     CCCC  ****WARNING: FNCTN REPLACES F2NCTG                              F2N00340
   ISN 0010                RHO=F2NCTG(X, I, ESTIM, IND)                                    F2N00350
                     CCCC  RHO = FNCTN (X, Y, SIGMAY, I, ESTIM, NPTS, WEIGHT)              F2N00360
                     C                                                                       F2N00370
   ISN 0011                DERIV(1)=RHO/ ESTIM(1)                                          F2N00380
   ISN 0012                DERIV(2)=RHO * ALOG(XI)                                         F2N00390
   ISN 0013                DERIV(3)=RHO * ESTIM(4) *  ESTIM(4) * (1.-XI * XI)              F2N00400
   ISN 0014                DERIV(4)=RHO * (2. *  ESTIM(3) * ESTIM(4)- ESTIM(2)/ ESTIM(4)) F2N00410
   ISN 0015                RETURN                                                          F2N00420
   ISN 0016              1 DERIV(1)=1.0                                                    F2N00430
   ISN 0017                DERIV(2)=1.E-10                                                 F2N00440
   ISN 0018                DERIV(3)=1.E-10                                                 F2N00450
   ISN 0019                DERIV(4)=1.E-10                                                 F2N00460
   ISN 0020                RETURN                                                          F2N00470
   ISN 0021                END                                                             F2N00480


                        ******  O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G ******
SYMBOL   INTERNAL STATEMENT NUMBERS
I        0002  0007  0010
X        0002  0004  0007  0010
Y        0002  0004
XI       0007  0008  0012  0013  0013
ABS      0005  0006
IND      0002  0010
RHO      0010  0011  0012  0014  0014
ALOG     0012
NPTS     0002
WAIT     0003
DERIV    0002  0006  0011  0012  0013  0014  0016  0017  0018  0019
ESTIM    0002  0004  0005  0005  0006  0006  0007  0010  0011  0013  0013  0014  0014  0014  0014
DELTAA   0002  0004
F2ERVG   0002
F2NCTG   0010
NTERMS   0002
SIGMAY   0002  0004
WEIGHT   0002  0003


                        ******  O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G ******
 LABEL   DEFINED   REFERENCES
     1      0016      0008

                                                    /  F2ERVG /     SIZE OF PROGRAM 0002E6 HEXADECIMAL BYTES

      NAME     TAG   TYPE  ADD.      NAME     TAG  TYPE  ADD.      NAME     TAG  TYPE  ADD.      NAME     TAG  TYPE  ADD.
         I  FA       I*4  0000AC         X  FA XR  R*4  000000         Y     XR  R*4  000000        XI  SFA      R*4  000080
       IND  FA       I*4  0000B4       PHO  SF     R*4  0000B8      ALOG  F  XF  R*4  000000      NPTS           I*4  0000BC
      WAIT           R*8  0000C8     DERIV  S  XR  R*4  000000    ESTIM  SFA XR  R*4  000000    DELTAA     XR  R*4  000000
   F2ERVG            R*4  0000C0   F2NCTG  F  XF  R*4  000000   NTERMS           I*4  0000C4   SIGMAY     XR  R*4  000000
    WEIGHT     XR     R*8  000000

 SOURCE STATEMENT LABELS

  LABEL  ISN  ADDR      LABEL  ISN  ADDR      LABEL  ISN  ADDR      LABEL  ISN  ADDR

  COMPILER GENERATED LABELS
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```
   LABEL  ISN   ADDR      LABEL  ISN   ADDR      LABEL  ISN   ADDR      LABEL  ISN   ADDR
  100001    2  000110    100002   10  00014C
*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
*OPTIONS IN EFFECT*SOURCE FREDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)
*STATISTICS*      SOURCE STATEMENTS =      28, PROGRAM SIZE =      742, SUBPROGRAM NAME =F2EVG
*STATISTICS*  NO DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                    242K BYTES OF CORE NOT USED
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*LEVEL 2.3.0 (JAN  78)                  OS/360  FORTRAN H EXTENDED          DATE 81.139/13.23.45       PAGE   1

REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EXTDICT NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM BM FLAG(I)

   ISN 0002                FUNCTION FCHISQ (Y,SIGMAY,NPTS,NFREE,MODE,YFIT, WEIGHT)          F2N00490
                     C                                                                     F2N00500
                     C  PURPOSE:  DETERMINE THE GOODNESS OF FIT (CHI-SQUARE) OF THE DATA WITH F2N00510
                     C            THE FITTED FUNCTION                                      F2N00520
                     C                                                                     F2N00530
   ISN 0003                  REAL*8 CHISQ, WAIT, WEIGHT                                    F2N00540
                     C                                                                     F2N00550
   ISN 0004                  DIMENSION Y(1),  WEIGHT(1), SIGMAY(1), YFIT(1)                F2N00560
                     C                                                                     F2N00570
   ISN 0005                    CHISQ=0.                                                    F2N00580
                     C                                                                     F2N00590
   ISN 0006                  DO 50 I = 1,NPTS                                            F2N00600
                     CCCC      WEIGHT(I) = 1./SIGMAY(I)**2                               F2N00610
   ISN 0007                    AYF=Y(I)-YFIT(I)                                          F2N00620
   ISN 0008                    IF(ABS(AYF).LE.1.E-10) AYF=1.E-10                         F2N00630
   ISN 0010                    IF(ABS(AYF).GE.1.E+10) AYF=1.E+10                         F2N00640
   ISN 0012                  WAIT = WEIGHT(I)                                            F2N00650
   ISN 0013                    CHISQ=CHISQ+WAIT*AYF*AYF                                  F2N00660
   ISN 0014          50        CONTINUE                                                  F2N00670
                     C                                                                   F2N00680
   ISN 0015                    IF(CHISQ.LT.1.E-20) CHISQ=1.E-20                          F2N00690
   ISN 0017                    IF(CHISQ.GT.1.E+20) CHISQ=1.E+20                          F2N00700
   ISN 0019                    FREE=NFREE                                                F2N00710
   ISN 0020                    FCHISQ=CHISQ/FREE                                         F2N00720
                     C                                                                   F2N00730
   ISN 0021          40        RETURN                                                    F2N00740
   ISN 0022                    END                                                       F2N00750

                          ******F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G******
SYMBOL   INTERNAL STATEMENT NUMBERS
I        0006  0007  0007  0012
Y        0002  0004  0007
ABS      0008  0010
AYF      0007  0008  0008  0010  0010  0013  0013
FREE     0019  0020
MODE     0002
NPTS     0002  0006
WAIT     0003  0012  0013
YFIT     0002  0004  0007
CHISQ    0003  0005  0013  0013  0015  0015  0017  0017  0020
NFREE    0002  0019
FCHISQ   0002  0020
SIGMAY   0002  0004
WEIGHT   0002  0003  0004  0012

                          ******F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G******
LABEL    DEFINED    REFERENCES
  40     0021
  50     0014       0006

                                                    /  FCHISQ /     SIZE OF PROGRAM 000280 HEXADECIMAL BYTES

      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.
         I  SI        I*4  0000C0         Y  F  XR  R*4  000000       AYF  SFA     R*4  0000C4      FREE  SF        R*4  0000C8
      MODE            I*4  0000CC     NPTS  F      I*4  000010      WAIT  SF     R*4  0000E0      YFIT  F  XR  R*4  000000
    CHISQ  SF         R*8  0000F8    NFREE  F      I*4  000014    FCHISQ  S     R*4  000008     SIGMAY     XR  R*4  000000
    WEIGHT  F  XR     R*8  000000

 SOURCE STATEMENT LABELS

   LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR

      50   14  000196            40   21  0001DA NR

 COMPILER GENERATED LABELS

   LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
   100001    2  000110       100002    7  000136       100003    9  000154       100004   10  000160
   100005   11  00016E       100006   12  000176       100007   15  000198       100008   16  0001A5
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*LEVEL 2.3.0 (JUNE 74)        FCHISQ          OS/360 FORTRAN H EXTENDED          DATE 81.139/13.23.45        PAGE   2
   100009   17  000144          100010   18  000152          100011   19  000186
*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)
*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOXSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)
*STATISTICS*      SOURCE STATEMENTS =       21.  PROGRAM SIZE =       640.  SUBPROGRAM NAME =FCHISQ
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******

                                                    292K BYTES OF CORE NOT USED
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*LEVEL 2.3.0 (JUNE 78)                    OS/360  FORTRAN H EXTENDED          DATE 81.139/13.23.42      PAGE   1

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002              FUNCTION F2NCTG (X, I, ESTIM, IND)                                        F2N00010
                 C                                                                               F2N00020
                 C  PURPOSE:  F2NCTG = ESTIM(1) * (XI ** ESTIM(2)) * EXP(APM)                    F2N00030
                 C            WHERE APM = ESTIM(3) * ESTIM(4) * ESTIM(4) * (1. - XI * XI)        F2N00040
                 C                                                                               F2N00050
   ISN 0003              DIMENSION X(1), ESTIM(1)                                                  F2N00060
                 C                                                                               F2N00070
   ISN 0004              ESTIM(4)=ABS(ESTIM(4))                                                    F2N00080
   ISN 0005              ESTIM(1)=ABS(ESTIM(1))                                                    F2N00090
   ISN 0006              XI=X(1)/ESTIM(4)                                                          F2N00100
   ISN 0007              IF(XI.LE.1.) XI=1.                                                        F2N00110
                 C  ********** WARNING:  THIS LINE WAS COMMENTED OUT                              F2N00120
                 CCCC  IF(XI.GT.2.E) XI=2.E                                                      F2N00130
   ISN 0009              APM=ESTIM(3)*ESTIM(4)*ESTIM(4)*(1.-XI*XI)                                 F2N00140
   ISN 0010              IF(APM.LT.-25.) APM=-25.                                                  F2N00150
   ISN 0012              IF (ESTIM(2).GE.65.) ESTIM(2)=65.                                         F2N00160
   ISN 0014              IF (ESTIM(2).LE.-65.) ESTIM(2)=-65.                                       F2N00170
   ISN 0016              F2NCTG= ESTIM(1) * (XI ** ESTIM(2)) * EXP(APM)                            F2N00180
   ISN 0017              RETURN                                                                    F2N00190
   ISN 0018              END                                                                       F2N00200


                      *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL   INTERNAL STATEMENT NUMBERS
I        0002  0004
X        0002  0003  0006
XI       0004  0007  0007  0009  0009  0016
ABS      0004  0005
APM      0009  0010  0010  0016
EXP      0016
IND      0002
ESTIM    0002  0003  0004  0004  0005  0005  0006  0009  0009  0009  0012  0012  0014  0014  0016  0016
F2NCTG   0002  0018

                                                  /  F2NCTG /     SIZE OF PROGRAM 00021E HEXADECIMAL BYTES

      NAME     TAG   TYPE  ADD.        NAME     TAG   TYPE  ADD.        NAME     TAG   TYPE  ADD.        NAME     TAG   TYPE  ADD.
         I  F        I*4   0000A4          X  F  XR   R*4   000000          XI SF       R*4   0000AB         APM SFA      R*4   0000AC
       EXP  F  XF    R*4   000000        IND           I*4   000080       ESTIM SFA XR   R*4   000000      FRXPR8       8F   R*4   000000
    F2NCTG S         R*4   000084

  COMPILER GENERATED LABELS

   LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
   100001    2  0000E0        100002    8  000116        100003    9  000122        100004   11  00014C
   100005   12  000156        100006   13  000162        100007   14  00016A        100008   15  00017A
   100009   16  000184

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

*STATISTICS*      SOURCE STATEMENTS =      17, PROGRAM SIZE =      542, SUBPROGRAM NAME =F2NCTG

*STATISTICS*  NO  DIAGNOSTICS GENERATED

****** END OF COMPILATION ******                                        292K BYTES OF CORE NOT USED
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*LEVEL 2.3.0 (JAN  74)          OS/360 FORTRAN H EXTENDED          DATE 81.139/11.26.24          PAGE   1

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOREORDER NOGOSTMT XREF ALC NOIMPSF NOTERM [HM FLAG(I)

   ISN 0002              SUBROUTINE MTINV1(A,N,DET)                                                    MTI00010
                C                                                                                      MTI00020
                C       GAUSS REDUCTION INVERSION WITHOUT ROW AND COLUMN INTERCHANGE.                  MTI00030
                C                                                                                      MTI00040
   ISN 0003             REAL*8 A,PVT,T                                                                 MTI00050
   ISN 0004             DIMENSION A(10,10)                                                             MTI00060
   ISN 0005             DET=1.                                                                         MTI00070
   ISN 0006             DO 1 J=1,N                                                                     MTI00080
   ISN 0007             PVT=A(J,J)                                                                     MTI00090
   ISN 0008             IF(DABS(PVT) .LT. 1.D-20) PVT=1.D-20                                           MTI00100
   ISN 0010             DET=DET*PVT                                                                    MTI00110
   ISN 0011             A(J,J)=1.0                                                                     MTI00120
   ISN 0012             DO 2 K=1,N                                                                     MTI00130
                C       DIVIDE THE PIVOT ROW BY PIVOT ELEMENT.                                         MTI00140
*  ISN 0013     2       A(J,K)=A(J,K)/PVT                                                              MTI00150
                C       REDUCE THE NON-PIVOT ROWS.                                                     MTI00160
   ISN 0014             DO 1 I=1,N                                                                     MTI00170
   ISN 0015             IF(I-J) 3,1,3                                                                  MTI00180
   ISN 0016     3       T=A(I,J)                                                                       MTI00190
   ISN 0017             A(I,J)=0.0                                                                     MTI00200
   ISN 0018             DO 4 L=1,N                                                                     MTI00210
   ISN 0019     4       A(I,L)=A(I,L)-A(J,L)*T                                                         MTI00220
   ISN 0020     1       CONTINUE                                                                       MTI00230
   ISN 0021             RETURN                                                                         MTI00240
   ISN 0022             END                                                                            MTI00250

                        ******F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G******
SYMBOL   INTERNAL STATEMENT NUMBERS
A        0002  0003  0004  0007  0011  0013  0013  0016  0017  0019  0019  0019
J        0006  0007  0007  0011  0011  0013  0013  0015  0016  0017  0019
K        0012  0013  0013  0014  0015  0016  0017  0019  0019
L        0018  0019  0019  0019
N        0002  0006  0012  0014  0018
T        0003  0016  0017
DET      0002  0005  0010  0010
PVT      0003  0007  0008  0008  0010  0013
DABS     0008
MTINV1   0002

                        ******F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G******
LABEL    DEFINED   REFERENCES
    1    0020      0006  0014  0015
    2    0013      0012
    3    0016      0015  0015
    4    0019      0018

                                                  /  MTINV1  /     SIZE OF PROGRAM 000254 HEXADECIMAL BYTES

      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.
         A  SF    00    R*8  000000         J  SF      I*4  000098         K  SF      I*4  00009C         L  SF      I*4  0000A0
         N  F           I*4  0000A4         T  SF      R*8  0000B0       DET  SF      R*8  0000A8       PVT  SFA     R*8  0000B8
    MTINV1          I*4  0000AC

  SOURCE STATEMENT LABELS

    LABEL  ISN   ADDR      LABEL  ISN   ADDR      LABEL  ISN   ADDR      LABEL  ISN   ADDR
        2   13   000110          3   16   000156          4   19   000182          1   20   000102

  COMPILER GENERATED LABELS

    LABEL  ISN   ADDR      LABEL  ISN   ADDR      LABEL  ISN   ADDR      LABEL  ISN   ADDR
    IB0001    2  0000CA   IB0002    7  0000F4   IB0003    9  000104   IB0004   10  00010C
    IB0005   15  000156   IB0006   15  00015E   IB0008   21  0001DC   IB0009   21  0001E6

*OPTIONS IN EFFECT* NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT* SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOREORDER NOGOSTMT XREF ALC NOIMPSF NOTERM [HM FLAG(I)

*STATISTICS*      SOURCE STATEMENTS =      21, PROGRAM SIZE =      596, SUBPROGRAM NAME =MTINV1
```

```
*LEVEL 2.3.0 (DEC 78)          (INVI        05/360 FORTRAN H EXTENDED          DATE 81.134/13.25.24          PAGE   2
*STATISTICS*  NO DIAGNOSTICS GENERATED
****** END OF COMPILATION ******

                                                    2888 BYTES OF CORE NOT USED
```

```
*LEVEL 2.3.0 (JUNE 78)                    OS/360  FORTRAN H EXTENDED          DATE 81.141/14.02.38      PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002                FUNCTION NUMBR (CARD, NUMVEC)                                                  NUM00010
                     C                                                                                    NUM00020
                     C  SIMPLIFIED VERSION OF NUMBER                                                      NUM00030
                     C  MOVES NUMBERS FROM CARD TO ARRAY NUMVEC.                                          NUM00040
                     C  STORES COUNT OF NUMBERS IN NUMB                                                   NUM00050
                     C                                                                                    NUM00060
   ISN 0003                IMPLICIT INTEGER (A-Z)                                                         NUM00070
                     C                                                                                    NUM00080
   ISN 0004                DIMENSION CARD(1),NUMVEC(1)                                                    NUM00090
   ISN 0005                DATA    BLANK/' '/,COMMA/','/                                                  NUM00100
   ISN 0006                DATA MINUS /'-'/                                                               NUM00110
   ISN 0007                DATA IZERO/'0'/,NINE/'9'/                                                      NUM00120
                     C                                                                                    NUM00130
                     C  ITRIG = SWITCH FOR NUMBER COLLECTED AND NOT STORED                                NUM00140
   ISN 0008                ITRIG = 0                                                                      NUM00150
   ISN 0009                INEG = 1                                                                       NUM00160
   ISN 0010                NUM = 0                                                                        NUM00170
   ISN 0011                NDEX = 0                                                                       NUM00180
                     C                                                                                    NUM00190
   ISN 0012                DO 60  COL=1,80                                                                NUM00200
   ISN 0013                IF (CARD(COL).EQ.MINUS) GO TO 40                                               NUM00210
   ISN 0015                IF (CARD(COL).EQ.BLANK) GO TO 60                                               NUM00220
   ISN 0017                IF (CARD(COL).EQ.COMMA) GO TO 50                                               NUM00230
   ISN 0019                IF(CARD(COL).LT.IZERO.OR.CARD(COL).GT.NINE) GO TO 90                           NUM00240
   ISN 0021                CALL I4A1BN(CARD(COL),1,NWORD)                                                 NUM00250
   ISN 0022                NUM = 10 * NUM + NWORD                                                         NUM00260
   ISN 0023                ITRIG=1                                                                        NUM00270
   ISN 0024                GO TO 60                                                                       NUM00280
                     C                                                                                    NUM00290
                     C  MINUS SIGN                                                                        NUM00300
   ISN 0025          40      INEG = -1                                                                    NUM00310
   ISN 0026                  GO TO 60                                                                     NUM00320
                     C                                                                                    NUM00330
                     C  END OF NUMBER, INEG IS SET TO 1 OR -1                                             NUM00340
   ISN 0027          50      NDEX = NDEX + 1                                                              NUM00350
   ISN 0028                  NUMVEC(NDEX) = NUM * INEG                                                    NUM00360
   ISN 0029                  INEG = 1                                                                     NUM00370
   ISN 0030                  ITRIG = 0                                                                    NUM00380
   ISN 0031                  NUM = 0                                                                      NUM00390
   ISN 0032             60 CONTINUE                                                                       NUM00400
                     C                                                                                    NUM00410
   ISN 0033             90 IF(ITRIG.EQ.0)GO TO 100                                                       NUM00420
   ISN 0035                NDEX = NDEX + 1                                                              NUM00430
   ISN 0036                NUMVEC(NDEX) = NUM * INEG                                                    NUM00440
                     C                                                                                    NUM00450
   ISN 0037          100   NUMBR = NDEX                                                                   NUM00460
   ISN 0038                RETURN                                                                         NUM00470
   ISN 0039                END                                                                            NUM00480

                                  ******F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G******

SYMBOL   INTERNAL STATEMENT NUMBERS
COL      0012  0013  0015  0017  0019  0019  0021
NUM      0010  0022  0022  0028  0031  0036
CARD     0002  0004  0013  0015  0017  0019  0019  0021
INEG     0009  0025  0028  0029  0036
NDEX     0011  0027  0027  0028  0035  0035  0036  0037
NINE     0007  0019
BLANK    0005  0015
COMMA    0005  0017
ITRIG    000A  0023  0030  0033
IZERO    0007  0019
MINUS    0006  0013
NUMBR    0002  0037
NWORD    0021  0022
I4A1BN   0021
NUMVEC   0002  0004  0028  0036

                                  ******F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G******

LABEL    DEFINED    REFERENCES
  40       0025     0013
  50       0027     0017
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
60	0032	0012 0015 0024 0026
90	0033	0019
100	0037	0033

/ NUMBR / SIZE OF PROGRAM 000252 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
COL	SFA	*4	00009C	NUM	SF	*4	0000A0	CARD	SFA XR	*4	000000	INEG	SF	*4	0000A4
NDEX	SF	*4	0000A8	NINE		*4	0000AC	BLANK		*4	0000B0	COMMA		*4	0000B4
ITRIG	S	*4	0000B8	IZERO		*4	0000BC	MINUS		*4	0000C0	NUMBR	S	*4	0000C4
NWOPD	SFA	*4	0000C8	14A1BN	SF XF		000000	NUMVES	S XR	*4	000000				

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
40	25	000190	50	27	0001A6	60	32	0001C4	90	33	0001D0
100	37	0001EC									

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	0000EC	100002	13	000116	100003	15	000128	100004	17	00013A
100005	19	00014C	200001	20	00015E	100006	21	000170	100008	35	0001D6

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 38, PROGRAM SIZE = 594, SUBPROGRAM NAME = NUMBR

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 292K BYTES OF CORE NOT USED

APPENDIX E

PROGRAM INPUTS:
SEGMENT NUMBER: 123
ACQUISITION#S: 78107 78151 78197 78233 78259
SUN ANGLES 56 56 54 48 49
LANDSAT NUMBER 2 2 2 2 2

```
CROP INFORMATION SUMMARY
TYPE  DATA

CROP       CORN
GREE      12.00.  11.50.  1.15.  1.50
*END
```

SUPPORTING RESEARCH MULTITEMPORAL CLASSIFICATION

PROCESSING DATE - 05/21/81 AT 13: 0

SEGMENT NUMBER - 123 CROP OF INTEREST - CORN

PIXEL SKIP FACTOR = 1 LINE SKIP FACTOR = 1
VERTICES (PIXEL, LINE)=(58., 3.) (64., 3.) (66., 8.) (60., 8.) (

TRAINING FIELD - LINE NO. SAMP. NO.

3.0	58.0
3.0	64.0
8.0	66.0
8.0	60.0

MEANS AND STD. DEV. FOR TRAINING FIELD BASED ON 10 PIXELS -

GREENES NUMBER		ACQUISITION DATES 78107	78161	78197	78233	78269			
1	MEAN	12.12	11.00	50.02	47.33	19.30	0.0	0.0	0.0
	STD. DEV.	1.10	1.01	4.31	2.40	1.73	0.0	0.0	0.0

CONSTANTS FOR MODEL -

CHANNEL NUMBER		A	ALPHA	BETA	TO	CHISQ
1	INITIAL	12.00	11.50	1.15	1.50	
	EST M( )=	12.000000				
	EST M( )=	12.056185				
	EST M( )=	12.034371				
	EST M( )=	11.9A74A3				
	EST M( )=	12.110775				
	EST M( )=	11.811844				
	EST M( )=	11.865816				
	EST M( )=	11.840574				
	EST M( )=	11.83A770				
	EST M( )=	11.837594				
	EST M( )=	11.8374A0				
	FINAL	11.84+- 0.00	19.94+- 0.00	2.10+- 0.00	1.61+- 0.00	2.87

PIXEL SKIP FACTOR = 1 LINE SKIP FACTOR = 1
VERTICES (PIXEL, LINE)=(1., 1.) (196., 1.) (196.,117.) (1.,117.) (

EST M( )=	11.837478
EST M( )=	13.858064
EST M( )=	11.255501
EST M( )=	11.247550
EST M( )=	11.255669
EST M( )=	11.257948
EST M( )=	11.257960

CLASSIFICATION FILE - RUN TIME: CP= 42.52 VIRTUAL CP= 41.65 IN MINUTES

DIFFERENCE IN INITIAL, ENDING CP TIMES IN HUNDREDTHS SECS.=255145
DIFFERENCE IN INITIAL, ENDING VIRTUAL TIMES IN HUNDREDTHS SECS.=249916

ORIGINAL PAGE IS
OF POOR QUALITY

SUMMARY OF ERRORS FOR THIS JOB	ERROR NUMBER	NUMBER OF ERRORS
	207	3

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